MEMORIALS OF HENRY FORBES JULIAN

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MEMORIALS

OF

HENRY FORBES JULIAN

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CYANIDING GOLD & SILVER ORES

A Practical Treatise on the Cyanide Process; its Application, Methods of Working, Design and Construction of Plant and Costs

By H. FORBES JULIAN

Mining and Metallurgical Engineer; Specialist in Gold; Late Technical Adviser, of the Deutsche Gold und Silber Scheide Anstalt, Frankfort-on-Main

And EDGAR SMART, A.M.I.C.E.

Civil and Metallurgical Engineer

CONTENTS: Early History of the Cyanide Process.—Preliminary Investigations.—Crushing.—Weighing and Measuring.—Percolation and Leaching.—Principles involved in Dissolution and Precipitation of Metals.—Dissolution of the Gold and Silver.—Temperature Effects.—Absorption of Air by Solutions.—Action of Various Cyanide Solutions.—Sources of Loss of Cyanide.—Precipitation.—Precipitation by Zinc.—Electrical Precipitation.—Other Methods of Precipitation. Cleaning-up, Refining, and Smelting.—Applications of the Cyanide Process.—Double Treatment.—Direct Treatment of Dry Crushed Ore.—Crushing with Cyanide Solution.—Slimes.—Dissolving the Gold and Silver in Slimes. Extraction by Successive Washings. Agitation and Natural Settlement.—Filter Presses.—Vats.—Essential Parts of a Cyanide Plant (Construction).—Piping, Cocks, Launders, and Buildings.—Handling Material.—Ropes and Gears for Haulage.—Belt Conveyors.—Pumps.—Spitzlutte and Spitzkasten.—Cost of Plant. Cost of Treatment.—Complete Plants.—Roasting.—INDEX.

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Frontispiece

H. H. Julian

Photo by Ciolina, Frankfurt

MEMORIALS

OF

HENRY FORBES JULIAN

MEMBER OF THE INSTITUTION OF MINING AND METALLURGY
JOINT AUTHOR OF "CYANIDING GOLD AND SILVER ORES"

Who Perished in the "Titanic" Disaster

WRITTEN AND EDITED BY HIS WIFE

HESTER JULIAN

AUTHOR OF "A MEMOIR OF WILLIAM PENGELLY, F.R.S."

WITH INTRODUCTORY NOTICES BY

THE REV. J. O. BEVAN, M.A., F.G.S., F.S.A.

AND

H. LIVINGSTONE SULMAN, F.I.C.

LATE PRESIDENT OF THE INSTITUTION OF MINING AND METALLURGY

ALSO

Letters from the "Titanic" and the "Carpathia"

WITH PORTRAIT AND PLATES

LONDON

CHARLES GRIFFIN & COMPANY LIMITED

EXETER STREET, STRAND, W.C.

1914

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TO THE MEMORY OF

THOSE BRAVE MEN ON
THE *TITANIC*

WHO SACRIFICED THEIR LIVES FOR THE SAFETY
OF THE WOMEN AND CHILDREN
I DEDICATE
THIS BOOK.

"*Of all the ways in which death can come, none is so noble as when it does so in helping to save the lives of others.*"

Extract from a letter of Sir J. J. THOMSON
on the death of HENRY FORBES JULIAN.

PREFACE

IN compiling this memorial the writer has not been prompted by her own feelings alone; rather has she yielded to the suggestions of friends, who were of opinion that the record of a strenuous life and of an unselfish personality, closed under tragic circumstances, would interest a wider circle. In the course of his profession as a mining engineer Henry Forbes Julian was called upon to travel in many lands. He was one of the pioneers of the metallurgical industry in South Africa; and was enabled to assist in the development of mining work in Germany, the United States, and Mexico. For these reasons it was felt that a record should be preserved of his adventures and experiences in districts, some of which are still but little known to English readers. In the text are interspersed illustrations relating to various localities to which reference is made.

Henry Forbes Julian visited the Victoria Falls on the Zambesi River before many white men had had the opportunity of seeing them; he was amongst the early explorers of the Barotse district; he brought home photographs taken by himself of some of the unique archæological features of ancient Mexico. These facts will furnish some idea of the range and novelty of his travels.

Indications are afforded in the text of his scientific acquirements, his patient industry, his adaptability to varied circumstances; whilst his letters set forth

his affectionate disposition and equable temperament. In this work it has been thought desirable to include contributions from two friends and close associates, each of whom deals respectively with his characteristics from a slightly different point of view: the Rev. J. O. Bevan, Rector of Chillenden, from the personal and temperamental, and Mr. Livingstone Sulman, late President of the Institution of Mining and Metallurgy, from the scientific and professional side.

The writer has felt that for her to assume the position of a critic would be alike undesirable and unbecoming. She has therefore simply endeavoured to trace her husband's life as it appeared to the one who knew him most intimately during the last strenuous decade. The natural regret that her knowledge of metallurgy is too limited to enable her to give any adequate summary of his services to science is softened by the fact that Mr. Sulman's sketch conveys a deeper impression than could have been gathered from any words of hers. Her thanks are due to him, to the Rev. J. O. Bevan, Mr. W. Crooke, Mr. S. Hartland, Dr. A. C. Haddon, and Mr. F. W. Rudler for their interest in the progress of the Memoir, and to those friends who have kindly allowed the inclusion of letters. Whilst keeping journals abroad (often hastily written on trains and steamers) she was indebted for a few of the facts mentioned to publications looked into at the time, which are now impossible to trace, but she gladly records her obligation, and wishes it were in her power to render a more adequate acknowledgment of these varied sources of information.

The Jubilee of the Devonshire Association, founded by her father, Mr. Pengelly, occurring in the year her husband started for the fatal voyage on the *Titanic*, and the desire of the latter to return speedily to England for its celebration, suggested the

inclusion of references to the life and work of the geologist.

The writer has entered upon her task in a different spirit from that which animated her in setting forth the similar memorial to her father. In that case there was fitly rounded off a career marked, amongst other things, by length of days. The worker had cheerfully laid down his tools—had ended his explorations—had accomplished his share of the world's work. In respect of Henry Forbes Julian, his life was sacrificed in the full vigour of manhood—the threads of the skein of existence remained unravelled. That such a life should have been suddenly and tragically brought to a close belongs to the mysteries of a world higher and more complex than ours. To his friends that fact will lend to this volume a pathetic interest; whilst for those to whom he was unknown the Memoir may afford some idea of the work already accomplished, which showed by its quality and amount how much more might have been expected from further researches by him in the science he loved so well.

The Life has been written under considerable disadvantages, owing to the illness caused by the biographer's bereavement.

REDHOLME, TORQUAY.
March 1914.

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I

"HENRY FORBES JULIAN"

By the REV. J. O. BEVAN, Rector of Chillenden

AMONG those who helped to swell the death-roll in connection with the disaster to the *Titanic*, few will be more missed than the distinguished metallurgical engineer, Henry Forbes Julian, of Redholme, Torquay, and some justification may therefore be found for a short sketch of his life, and an appreciation of his genius and character from one who had special opportunities of obtaining information and was admitted into his intimate friendship.

To begin at the beginning, I may say that it was in the autumn of 1880 that I made the acquaintance of the late Mr. William Pengelly, F.R.S. In that year the meeting of the British Association for the Advancement of Science was held at Swansea. In the Anthropological and Geological Sections there a Report was presented by Mr. Pengelly in relation to investigations into the prehistoric remains found in Kent's Cavern. Such reports had been rendered by him, year by year, for a considerable period.

Some time afterwards, in 1893, I was introduced to his youngest daughter, Miss Hester Pengelly. That introduction formed the beginning of a friendship which has continued to the present time, owing to the deep appreciation I have been led to

entertain for one whose character and accomplishments have endeared her to a wide circle of acquaintances.

In 1902, in view of her approaching marriage, Miss Hester Pengelly held a reception at her club in London, and it was under those circumstances that I first met Mr. Forbes Julian. Since that day I have enjoyed many opportunities of cementing the friendship thus happily begun. We were accustomed to meet at the annual gatherings of the British Association and at the lectures of the Royal Institution, as well as in the ordinary circles of social life. We proceeded together in the *Durham Castle* to the British Association meeting in South Africa in 1905, and during the close association which a long sea voyage brings about, the great capacities for friendship which Mr. Julian possessed were fully displayed.

His married life was ideal. His wife shared his literary and scientific tastes, and frequently accompanied him in his travels in America, South Africa, and elsewhere, when scientific meetings or the exigencies of professional work called him abroad. Those who are acquainted with the community of affection and interest which signalized their life together are not surprised at the tributes that have been rendered to his memory even from the highest in the land, which have tended in some slight measure to comfort and solace his widow in her first hours of loneliness and sorrow.

The last time I saw Forbes Julian was on March 29th, 1912. At my invitation he had attended at the Royal Institution a lecture delivered by Professor Sir J. J. Thomson on "Results of the Application of Positive Rays to the Study of Chemical Problems," and at its conclusion he addressed to me a few playful words regarding the reception which he suggested

certain chemists would probably accord to the novel theories advanced by the distinguished physicist. He then spoke of his intended journey; we clasped hands together; I uttered a hearty wish for a pleasant time and a speedy return. Thus we parted! Little did I think that I should never see his face again. Not long after, whilst travelling in France, I was startled by reading in the public Press of the supreme disaster which had overtaken the most finished and powerful illustration of man's handiwork. My heart misgave me, for I was conscious of the possibility of the swallowing up in the sea's dread vortex of at least two of my friends—one my first pupil and lifelong correspondent, Mr. Hipkins; the other, Mr. Julian, whom I had equally been led to admire and to regard with unfeigned esteem.

Forbes Julian was a metallurgist of no mean order. For many years he had been concerned in the practical application of theory to practice in this most important department of the industrial arts. His name and work were recognized over three continents. His advice and opinions were sought in lands far and widely separated, and were valued because they were felt to be informed by knowledge and experience, and directed by honesty and plain dealing. He was not only admired for his intellectual attainments, his practical ability, and his fearlessness as a traveller, but was also universally esteemed for his high standard of life, his unaffectedness, and his amiability. In social circles I particularly remarked his quiet, restrained, equable manner. He was cheerful and serene, his humour was delightful and contagious. Doubtless after his marriage his character expanded and matured under the gracious influence exercised by her who is left to cherish his memory even as she laments his loss.

To me—to many—the world is the poorer for the removal from our midst of Henry Forbes Julian. To me, indeed, it is a heavy blow. I am nearing the term of man's existence. The time is past for the making of new friends, so that I can the less afford to lose those already grappled "as with hooks of steel." Although not conscious of any great capacity for friendship, I have been singularly fortunate through life in the knowledge and intimate relationship of a few choice souls. The number is sadly lessened by this catastrophe; a link with the past is broken, and the rapid running down of the sands of time forbids the utilization of any opportunity of welding together the severed parts. But the sunset of life illuminates the path already trod, and its declining rays gild spaces that have become hallowed ground. Darkness, indeed, comes on apace, but, thank God, there is still sufficient light to enable one to perceive the dim outlines of the Temple of Life—with its various altars consecrated to the friendship of kindred souls.

This day I stand before such an altar, I call upon the name of my friend. I thank God for his fellowship in life and his memory in death!

Such a man must be mourned by all—by his colleagues, as a man of science and philosophic insight; by his intimates, as an incomparable companion and friend; by the partner of his wedded life, as a part of herself—severed, indeed, for a time by unkindly fate, but destined to be reunited, and that for ever.

J. O. BEVAN.

CHILLENDEN RECTORY,
CANTERBURY.

II

"HENRY FORBES JULIAN"

By H. LIVINGSTONE SULMAN, F.I.C., M.I.M.M.,
late President of the Institution of Mining and Metallurgy

"H. F. J., a Reminiscence by H. L. S."

I FIRST met Henry Forbes Julian in 1895 at Johannesburg, where I had been summoned in connection with certain developments in the cyaniding of gold ores. This wonderful metallurgical method, which has meant so much not only to the Witwatersrand but to the world at large, although then but a few years old, had even thus early been brought to a state of high efficiency by a circle of keen, practical, and scientific engineers, whose work indeed already made Johannesburg the Mecca of the metallurgist.

It was truly a golden era, wherein one was privileged to know such men as Charles Butters, W. R. Feldtman, Andrew Crosse, Irvine Williams, Jennings, and others of a now world-famous confraternity. Amongst these the name of Forbes Julian held a deservedly high place, and in the prosecution of my work I found myself constantly referred to his exhaustive studies in regard to the action of oxidants in cyanidation.

It was a keen pleasure to meet in him one whose knowledge of the subject was as profound as his method of imparting it to others was modest and generous.

Although through stress of work I saw him but a few times at that period, his peculiar charm of manner left a lasting impression upon me.

My business calling me to other countries, it was many years before we met again; but in the interval Forbes Julian (in collaboration with Edgar Smart) had published the text-book "Cyaniding Gold and Silver Ores," which has made his name so widely known; in my opinion it is the best work yet written on a subject which has already inspired so large a number of technical authors.

It was at the Mining and Metallurgical Club in London that we next forgathered—once again with Mr. Charles Butters, whose consulting engineer in England Forbes Julian now was. Thereafter, at luncheon, Forbes Julian, my partner, Mr. H. K. Picard, and I constantly met. We appeared naturally to gravitate together—sometimes reviewing old theories in the light of experience gained in the intervening years, but more often discussing the prospects and problems of the present. Here again an unassuming but patient thoroughness was characteristic of Forbes Julian's technical outlook, and infallibly indicated the reason for the trust reposed in him by one of our most brilliant and successful engineers—a man who has little need to rest on the advice of any, but to whom that of Forbes Julian was of long-proved worth.

We met almost daily for some months, except during the week-ends, which he spent at his beloved home in Torquay. His obvious delight in returning there each week has now a deeply pathetic aspect we could not then foresee. Each Monday brought him back to London, always with a fresh note of the charming countryside and home he had left behind.

After all too short a period, he told me he would

be again leaving England for a while to visit Mr. Butters in California. A few days later the news was flashed back to us that Henry Forbes Julian, together with the other heroes of the R.M.S. *Titanic*, had given to the world a last triumphant proof of his calm and steadfast manhood.

CHAPTER I

EARLY LIFE

HENRY FORBES JULIAN, the son of Henry and Maria Julian of Cork, belonged to one of those families of mingled Irish and Scottish descent whose members have at various times rendered important service both to Church and State and have proved active workers for the British Empire. The Julians could also trace their descent from a Huguenot family of the name of *Julien*—a family of considerable distinction which came from France and settled in Ireland after the Revocation of the Edict of Nantes. Leaving their native land for ever, they preferred exile, loss, and the surrender of all for conscience' sake rather than abjure the Protestant faith.

Robert Julian, the great-grandfather of the subject of this Memoir, was appointed Governor of Spike Island. His son Thomas married Margaret Forbes, of the Aberdeenshire family well known in Scottish history, and in 1856 their son Henry Julian married Maria Neligan, the daughter of an Irish officer who had served all through the Peninsular War with conspicuous heroism, and had taken part with General Picton's Brigade at the siege of Badajos. Amongst recent members of the family may be mentioned Canon Neligan of Dublin; Bishop Neligan, late of Auckland, New Zealand; Judge Neligan; and Miss Dorinda Neligan, a noted hospital nurse in the Franco-German War. She afterwards became head mistress of the Girls'

High School at Croydon, and was one of the pioneers of the movement for the higher education of women in this country.

Henry Julian and his wife spent the early years of their married life at Cork, and it was in this beautiful city that most of their ten children were born, and that their second son, Henry Forbes Julian, first saw the light, his birthday being on May 9th, 1861, which in that year fell on Ascension Day. Passing his early childhood amongst the picturesque and romantic scenery of the South of Ireland, the boy's love of nature early developed into almost a passion, which remained with him throughout his life. In later years and in the course of his extensive travels of many thousand miles, over three continents, the contemplation of the scenic beauties revealed to him afforded keen and unfailing delight.

In company with his elder brother Tom, he received his early education at a school in their native city, but when he was about eight years of age his parents removed to Bolton, in Lancashire. The change from the mild climate of Cork to the bleak air of the North of England, and to a smoky manufacturing town after residing in a beautiful country district, was most unwelcome to the boy. The tall chimneys of the Lancashire factories and the depressing aspects of the mills and workshops were a poor substitute for the green hills of co. Cork or Kerry, and even at this early age the longing of his heart was to be back again amongst the loughs, mountains, and rivers that he had known and loved so well, and to be once more amidst the simple country people who tilled the soil, harvested the crops, and tended cattle, far from the noise of machinery, the turmoil and din of warehouses and offices, and the high pressure of life in a great commercial centre.

His childhood gave little promise of the latent powers within him and of the capacity for concentration and hard work he was later to display. He is described by those who knew him as a bright, sunny-dispositioned boy, with all a true boy's devotion to play, of boundless activity, and exceedingly fond of the country and of outdoor life. In company with his brother Tom, he would spend hours rambling over the country-side and exploring the adjacent moors and fens.

In 1870, soon after the family had settled in Bolton, the war between Germany and France broke out, and Mrs. Julian's two unmarried sisters, Dorinda and Annie Neligan, volunteered to nurse the sick and wounded soldiers, under the supervision of a friend of the family, the celebrated surgeon Mr. (afterwards Sir William) MacCormac, Surgeon-in-Chief of the English Ambulance. Their letters from the seat of war to their sister, describing many stirring adventures and interesting incidents in connection with their work within the French and German lines, excited the boy's warmest interest, and may have served greatly to stimulate the hopes he always entertained of future opportunities for foreign travel. These hopes were fully gratified when in later years he became consulting engineer to the German *Gold und Silber Scheide-anstalt* at Frankfort-on-Main, and in that and other capacities made repeated visits to the Continent.

Hereditary influences would probably have inclined him to a professional career similar to that which so many of his ancestors had followed, either in the Church or the Services, had not his change of environment tended to direct his energies into other channels. From the beginning of his school life he evinced a decided taste for literature; and after

being for some years at school at Bolton he began to manifest interest in engineering and mechanical pursuits, so that whilst still a youth he commenced taking a practical part in the works his father had established.

At this period of his career he was in the habit of getting to the works every morning before six o'clock, and there assisting his father and helping to supervise the workmen. Such was his industry, however, that his evenings were given up entirely to reading until nearly midnight. The bent of his mind at this time was towards mechanics, apparently without as yet any thought of the science of metallurgy, which was ultimately to become the work of his life. It was not until a year or two later, when he was at Owens College, Manchester, under the stimulative guidance of Sir Henry Roscoe, that his first love of science was aroused. Of the many avenues of research now opening up to him, he soon determined to select metallurgy as his special field. His spirit was stirred with a new enthusiasm by the desire for attaining scientific knowledge, which increased with his years. It was with no motive of self-advancement, but from devotion to metallurgical research, that he became induced to abandon the literary subjects which had attracted him in his school-days in favour of this pursuit. Whilst still, however, continuing his mechanical studies, he now threw himself actively into investigations connected with mining and metallurgy, the professor's influence producing a strong and abiding impression on his mind and constituting the turning-point in his life.

How successful he was in his studies is shown by the fact that he ultimately became a recognized authority on cyanidation, and the joint-author of the most widely consulted text-book on the subject; while

his advice as a technical expert in metallurgical matters was sought for and prized in Germany, South Africa, the United States, Canada, and Mexico.

For the time, however, he was engrossed in his studies and making rapid advances. In this manner the early period of boyhood and home life passed by, usefully, if uneventfully, and he stood on the threshold of his career, thoroughly grounded and well equipped for the professional studies that were to lead him far and wide. The succeeding years were to be marked by strenuous labours in distant lands, and by voyages and travels to those foreign countries of which he had dreamed in childhood. The story of this portion of his life and of his professional work at home and abroad will be developed in the succeeding chapters.

CHAPTER II

TECHNICAL WORK IN SOUTH AFRICA

IT was in the year 1886 that Henry Forbes Julian, who was then in his twenty-fifth year, left England for South Africa. He landed at Durban, the largest and most beautiful city in Natal, ready and anxious to try conclusions with Colonial life, and acutely aware of the fact that he had still much more to learn than could be acquired in the laboratories and lecture-theatres of his own country. In South Africa he soon found a fitting field for his energies, and, despite his comparative youth and his inexperience, secured work for himself as a mining engineer at Barberton, Johannesburg, and Kimberley, superintending the shaft-sinking and surface equipment of several mines, and the erection and operation of a number of crushing-mills and reduction plants.

With this work the chapter of his scientific career may be said to have opened. Gifted with perseverance and the spirit of research, he attained comparatively early in life to considerable distinction as a mining expert and metallurgist, and although at first very lonely and friendless, his enthusiasm and industry soon brought him the notice and won him the respect of other workers in the same field. It was by his own diligent labours that he obtained a true conception of metallurgical principles, all his knowledge being gained in the hard school of experience.

He needed all the support and distraction that constant occupation could give him, for in 1887 he suffered a severe bereavement in the loss of his mother. Although she had been in failing health when he left England, her last illness and death was an irreparable blow to him, and had an effect from which even his buoyant nature did not enable him to recover for a considerable period. Like many laborious workers, he owed much to his mother, who was a woman of strong and beautiful character and unfailing in her devotion to her children. He had already lost his brothers Tom and Ernest and also two sisters, and the thought of the loneliness and bereavement of the remainder of his family caused him great uneasiness, and made him long to be at home to comfort and support them in the first months of grief and sorrow. He knew, however, that he could best assist his father by continuing to work assiduously in his new sphere of labour, although the hardships of this early period of his career, far from home and in a strange land, rendered him specially sensitive.

Perhaps the most lasting impression one can gather of him at this time is that he was endowed with a deeply affectionate nature. In the few records that remain, family touches are abundant and make up a picture of extreme tenderness, showing how responsive he was to all the influences of generous and kindly affection.

Those who are acquainted with the many temptations which beset men's lives in mining camps will realize the strength of purpose and manliness of character which enabled the young metallurgist to pass through them unharmed, and to preserve amongst these strange and distant surroundings the warmth of his love for his relatives at home.

A quarter of a century ago the South African mines

were crowded with adventurers from all parts of the world, who were indulging in golden hopes and spending their energies often in the vain pursuit of that shadow—sudden wealth. Everywhere men were searching for gold, and the success of the minority stimulated the less fortunate. A few made large fortunes, but many were ruined, not being content with the slower and safer profit of other forms of labour. From this struggle for riches there ensued the inevitable loose commercial morality and the accompanying low standard of public and social life, so often characteristic of such communities. But this atmosphere seems never to have affected Forbes Julian. From boyhood his course had been marked by uprightness of purpose and action and devotion to the cause of duty. He was averse to betting and gambling and a total abstainer from alcoholic beverages. Temperance was less common in the eighties than at present, and he had often been warned by friends of the danger of drinking water only, in districts where sanitation was so imperfect. In later years, however, those who had feared for his health as a teetotaller assured him that he owed his immunity to disease in the many malarial districts he visited in different quarters of the globe chiefly to his temperate habits !

It has been frequently stated that a man's character is best revealed by his behaviour on his travels, as it can then be judged whether his disposition remains the same when the restraints of public opinion and the force of habit are removed. It will be seen that the young metallurgist never drifted with the prevailing current when he broke ground for himself in a fresh country. He was always true to his best nature.

His earliest work was at Barberton, which had

recently been opened up as a mining centre, for it was in 1886—the year of Forbes Julian's arrival in South Africa—that the discovery had been made of the Sheba Mine there. This is said to have been found quite accidentally by a prospector who, after several months of unsuccessful search, seated himself idly one day on a piece of rock near the footpath which he and his comrades had worn in their walks between their huts and the area they were prospecting. A chance blow from his hammer struck off a piece of the rock, which at once attracted his attention and concentrated all his energies on the locality. He had, in fact, discovered the famous gold-mine, the rich yield from which was afterwards quite phenomenal. This at once created a fever of excitement in South Africa. A rush was made to Barberton, men flocking there in hot haste from all parts of the world, although many were entirely without experience of the mining industry.

Early in 1887 it is stated that there were between five and ten thousand people in the district. The collection of huts soon grew into an important township, with hotels and public buildings. The natural consequence of this scramble for wealth was wild speculation; doubtful companies were rapidly floated and unscrupulous operations led to the inevitable reaction and collapse, distrust becoming widely prevalent.

Almost immediately afterwards the steady development of the far richer Witwatersrand reefs made that area the centre of attraction and turned thither the tide of gold-seekers.

The neighbourhood of Barberton was at first very unhealthy. Even when sanitary methods improved, malaria still lurked in the low-lying areas along the river-banks. The climate was also extremely trying in summer to those coming direct from England, but

Forbes Julian does not appear to have been seriously affected by this or any of the other disadvantages he encountered. The situation of the little town nestling under the shelter of the Kaapsche Berg greatly attracted him. The locality is remarkably picturesque and embraces an extensive view of the De Kaap Valley, whilst shady creeks of rare beauty abound clothed with tree-fern, eucalyptus, cactus, aloe, and many other subtropical plants and trees.

In the year 1887 he left Barberton, and with his colleague, Mr. Wanliss, who was then acting with him as consulting engineer to the Johannesburg Pioneer Company, erected a small plant to treat blanketings from the company's first stamp mill. A process was worked out by which the gold could be dissolved out of the ore and precipitated without separating the solution. An account of this in his own words shows that it involved the use of "an amalgamation barrel, a receiver for the treated ore, and an amalgamated copper plate with mercury wells. . . . The gold extracted by this little plant amounted to about ninety ounces per month.

"The assays showed that a considerable amount of gold still remained undissolved in the tailings, and it was found impracticable to get anything like complete precipitation of the dissolved gold in the time allowed. A longer treatment might have been given and a better extraction obtained, but that meant a decreased output of gold, which is a serious item to a small struggling company just beginning operations.

"A much more perfect plant was erected at the Roodepoort United Main Reef Company's mill in 1888."[1]

[1] "Cyaniding Gold and Silver Ores," by H. Forbes Julian and Edgar Smart, pp. 3 and 4. London: Charles Griffin and Co. Ltd.

It is interesting to notice that at the same time that this small plant, erected by Forbes Julian and Mr. Wanliss, was being used by the Pioneer Company, other workers in the same branch of science—Mr. J. S. MacArthur, Mr. R. W. Forrest, and Mr. W. Forrest—were experimenting in Scotland with samples of gold ore. They applied in October 1887 for a patent, based on similar principles, in Great Britain for "the purpose of extracting gold and silver from ores by dissolving out the metals with a solution containing cyanogen or a cyanide." Their work lent to the gold-mining industry valuable assistance, which has since been greatly appreciated by all mining engineers and metallurgists, and their names will always be connected with the successful working out of the cyanide process.

During the years 1888 and 1889 Forbes Julian was busily engaged on fresh researches in connection with the dissolution of gold in ores, by chlorine and also by cyanide, under high pressure, with subsequent precipitation by an electric current and by sodium amalgam. This work resulted in some applications for patents in South Africa. For oxidized ores the dissolution of the gold by chlorine under pressure of air and precipitation by sodium amalgam was as perfect as could be desired; in fact, some blanketings containing 34 oz. per ton had only about 7 dwt. left in the residue, equivalent to a 99 per cent. extraction. The fine gold was dissolved and re-precipitated, while the coarse gold was made easily amalgamable. But when pyritic ore was being dealt with, it was found that the solution of the gold became impracticable without an excessive consumption of chlorine, and it was necessary again to revert to the use of cyanide as a solvent, while in order to precipitate the dissolved metals an electric current was employed, the anode

being iron or lead peroxide, and the cathode mercury. A number of experiments were carried on at Johannesburg and Kimberley in 1888–89 embodying these latter ideas and dealing with ton lots at a time.

In the midst of these investigations recreation and diversion were to be found in the pursuit of big game—for Forbes Julian was a good shot—and in travelling through the native districts, which were at that time somewhat unsettled and dangerous to visit. He explored many places where but few white men had previously penetrated in the Barotse district and the Upper Zambesi Basin, frequently journeying on foot or being jolted in ox-wagons or cramped in canoes. Although somewhat shy and diffident, he was fond of congenial companionship, and as he became better acquainted with his environment his amiability and unaffectedness won him popularity with many of the rough but well-meaning comrades by whom he was surrounded, whilst his force of character gained their respect.

He also formed a few loyal and lasting friendships with men eminent in the mining and scientific world—friendships to be severed only by death.

Mr. H. L. Sulman, who first knew him in the Transvaal, writes :

" . . . His sterling qualities gradually asserted themselves ; his modesty, patience, thoroughness, and his broad yet clear sight, marked him as exceptional among many more apparently brilliant men. There was a quiet magnetism of personality he unconsciously exerted, so unconsciously that we only now realize by missing it. We know that he met death with clear, calm vision, just as he looked at other problems—unflinchingly. . . ."

Mr. Charles Butters, another mining friend of the early South African days, with whom he was destined

in future years to have much intercourse and correspondence, writing from California, says :

"His memory will always be an inspiration to me. We always think of him first as a gentleman because of his gentleness, sweetness of disposition, extreme modesty and consideration for others, never being willing to hurt anyone's feelings. These are the qualities that are first in man, and they are the qualities which one always remembers, but when added to such a brilliant intellect and well-stored mind it only makes them doubly precious."

Another fellow-worker in the same field of scientific activity describes him as a brilliant but most modest comrade, and goes on to say : "His untiring energy and enthusiasm helped everyone who had the good fortune to come in contact with him, and his personal high standard of life won the admiration of all."

His colleague, Mr. Edgar Smart, writes from the Transvaal :

"In the early days Mr. Julian was consulting engineer to the Johannesburg Pioneer General Mining Company. I first knew him in Kimberley in 1889. He, however, seldom talked of himself, and scarcely ever on business, his interests lying in scientific and technical matters. . . . His kindness to my wife, and to me, will never be forgotten by either of us. . . ."

CHAPTER III

TRAVELS IN CENTRAL AFRICA

IT is, perhaps, only those who, having visited South Africa in the early days of mining enterprise and development, have themselves experienced it who can realize the sense of loneliness so often felt by British settlers and the utter lack of many of the requirements regarded at home as almost indispensable to social life. Added to this, the professional man of those days was confronted with almost ceaseless toil, which monopolized his energies and prevented his deriving advantage from such opportunities as might from time to time present themselves. Hence the need for hopefulness and patience, and hence, likewise, it arose that, although his courage and perseverance secured to Forbes Julian opportunities for a wider sphere of activity and advancement in life, circumstances he could neither influence nor control prevented his deriving benefit from them when they came.

Like so many men of British race who are resident in the Colonies, Forbes Julian was a staunch Imperialist, and in his travels in the Barotse district and in the Upper Zambesi Basin he was impressed, as a pioneer of Empire, by the position of these districts, within easy reach of British South Africa. Enjoying a fertile soil, full of natural resources, and having many fine waterways, it seemed strange to him that these regions had been so long neglected.

Becoming convinced that there were great openings

for British trade and industries in these forest regions and plains of Central Africa, he secured, by dint of patience and perseverance and after many hardships and adventures, certain valuable rights and concessions from the native chiefs for the development of these fertile lands and their opening up to British commerce.

South and Central Africa in the eighties offered a fine field not only to the metallurgist but also to the traveller and pioneer. Forbes Julian, who was an enthusiastic traveller and a keen observer, traversed large tracts of country which had only recently become accessible. With companions from Kimberley he visited King Khama's territory; but on arriving there they were met by a dire disappointment. The king informed them that they could not in safety proceed further with their wagons and oxen; that he was responsible for their lives to the great White Queen, and that he would not sell them any oxen for proceeding on the journey which had been contemplated, as further travel would be extremely dangerous. The other members of the party were finally constrained to remain in Khama's territory, to rest themselves and their cattle, and be content with the journey already accomplished. Not so Forbes Julian, who had that quiet energy of temperament which generally enabled him to achieve what he had undertaken, and was not easily discouraged by difficulties, even though they might appear insurmountable to others. Being determined to push on alone, he accomplished a visit to the native chief or King Lewanika, and other native chieftains, and had the satisfaction of reaching the Falls of the Zambesi.

These impressive Falls, which were then but little known, are twice as broad and more than twice as high as those of Niagara. The immense volume of

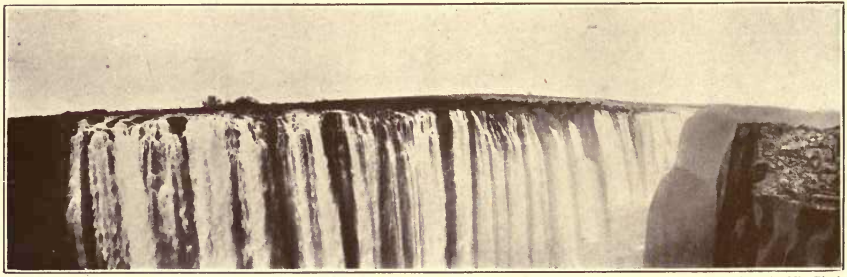
water is precipitated into a deep narrow fissure, from which there is but one small outlet to the chasm. This has been appropriately named the "Boiling Pot" by Europeans and the "Thunder Mist" by the natives.

To those who have never beheld it the beauty and splendour of the scene are indescribable and inconceivable. Indeed it is impossible to comprehend the wonderful spectacle in a single visit.

The traveller stayed some time studying the Falls from several different points of view, and became increasingly fascinated by their grandeur and sublimity.

The first impression of these wonders of nature constituted one of those epochs in life which could never be forgotten by one whose love of fine natural scenery was so strong, and he felt stirred to the greatest enthusiasm. The view of the Victoria Falls and the poetic beauty of the "rain forest" and Zambesi Valley more than repaid him for the perils of the way, which had been neither few nor slight. The necessity of having to walk the last few hundred miles with black men as his baggage-carriers and only companions rendered the exploit extremely hazardous and more daring than wise. This will be gathered from the fact that when on the return journey he was prostrated by fever, he discovered that the natives had begun discussing the chances of his death, and questioning amongst themselves whether they should not at once put him out of the way. Having always been careful to treat them humanely and justly, he had hitherto experienced no difficulty in their management, but with the helplessness of illness his influence over them as a white man was endangered. He had picked up a good deal of their language, and was thus able speedily to gather from their excited talk and violent looks

THE GREAT TREE, VICTORIA FALLS



Photos by Miss Black

VICTORIA FALLS

and gestures that they were plotting against his life. The situation was serious, for he felt convinced that they intended to murder him, and the truth flashed upon him that he must instantly demonstrate his ability to defend himself, which was probably in doubt. Rising up and taking his rifle with him, he aimed at a distant object, striking it immediately, as he was, fortunately, an excellent shot. The effect was remarkable. The carriers looked at him with astonishment, followed his movements intently, and, perceiving that he had apparently recovered, gave him no further trouble.

The attack of fever gradually subsided, and he was able to recommence his march and rejoin in perfect safety the other members of his party in King Khama's territory, full of thankfulness for his preservation from danger and well satisfied with the results of his exciting journey. "He always seemed incapable of fear," wrote one who knew him intimately.

On the way back to Kimberley with his companions other troubles assailed them, and the forces of nature seemed arrayed against the party. Some of the rivers were in flood, and they had to make repeated halts. The difficulties presented by these swollen streams where the wagons sank so deeply, and by the miry banks where the oxen could scarcely stir them, will be realized by all who have travelled in these districts. On one occasion their wagons overturned while fording the waters, and several almost indispensable possessions were lost. By strenuous exertions and at great personal risk he was, however, able to recover some valuable papers, to secure which had been the main object of his long and arduous journey, for, in spite of many obstacles on this expedition, he had acquired certain concessions in the Barotse district.

This district is frequently alluded to as the Barotse

Empire. Forbes Julian uses this expression, and that eminent ethnologist Dr. A. C. Haddon speaks of the "Barotse Empire" in his Address to the Anthropological Section of the British Association at Cape Town in 1905. It was not merely a province, but was looked upon as an empire by the Portuguese, Lewanika's authority being recognized by several tribes. His intelligence enabled him to desire education and civilization for his people, and the increase of commerce and industry.

The result of Forbes Julian's negotiations on this occasion is dealt with in the following communication from a well-known firm of solicitors, to which is appended his own report.

To the Rt. Hon. Lord Knutsford, *Secretary of State for the Colonies*

Kimberley,
South Africa,
6th July, 1889.

My Lord,—I have the honour to communicate with your Lordship with reference to the regions in the Upper Zambesi Basin.

From the latest English newspapers received here it appears that considerable attention has lately been directed in England to the question of the rights over and to territories of independent native chiefs situate beyond British Bechuanaland.

I am instructed by Mr. Henry Forbes Julian to inform your Lordship that he has acquired considerable and valuable rights and concessions over the Barotse Empire, some particulars concerning which are set forth in the accompanying Memorandum prepared by Mr. Julian and entitled "Notes on the Barotse Empire Past and Present."

I also enclose a sketch-plan showing the principal navigable rivers, position of provinces, &c., in the Barotse Empire.

Your Lordship will observe from the general remarks contained in the "Notes" that it is Mr. Julian's intention shortly

to enter into negotiations with the view of opening up and developing the country of the Barotse tribes.

In view of the discussions presently taking place in England regarding Central Africa, Mr. Julian has deemed it advisable that your Lordship and Her Majesty's Government should be made acquainted with the true position of affairs so far as the Barotse Empire is concerned, in order that the English Government, in dealing with the important question of Central Africa, may be in a position to know how matters stand.

Should your Lordship deem it advisable in the interest of the British nation that any further information be supplied to you, I shall be prepared to furnish further particulars.

As matters progress I shall probably again have the honour of communicating with your Lordship.

Your Lordship might kindly give instructions that the word "Confidential" be endorsed on the envelope of any letters addressed to me with reference to this matter.

All communications connected with this matter will be considered by your Lordship as being confidential, and it is understood that the information furnished will only be used for Government purposes.

I have the honour to be,
My Lord,
Your obedient servant,

J. Dunoon Duncan.

NOTES ON THE BAROTSE EMPIRE RELATIVE TO ITS COMMERCIAL DEVELOPMENT

By HENRY FORBES JULIAN

General Features of the Country

The Barotse Empire is situated between parallels 19° S. and 11° S. and is from 19° E. to 30° E. of Greenwich.

It is bounded on the north by the watershed dividing the Zambesi and Congo River systems; on the north-west by the Kasai River and the watershed dividing the Zambesi and Quanza River systems; on the west by the River Kwando; on the south by the Rivers Kwando and Zambesi; on the east the boundary is undefined, but the Chief Lewanika maintains that his territory extends to the River Loangwa

and demands tribute of all chiefs to that point. Zumbo is considered outside the territory, but the towns Maashi, on the west side of River Kwando, and Kalende, on the north bank of the River Kasai, belong to the Barotse chief.

The provinces are eleven in number, viz. Mamboii, Mambunda, Macei, Barotse, Masubia, Matutala, Makuangua, Mankoia, Mashikulumbi, Matoka, Mashapatan.

The area is, roughly, about 280,000 square miles, and the mean elevation is about 3000 ft. above sea-level. There are very extensive plateaus or elevations of 2300 to 4500 ft. above sea-level which have salubrious climates, while the valleys and low-lying parts are malarial during portions of the year. Considering the tropical position of the country, it is on the whole remarkably healthy, large portions of it being well adapted for Europeans.

The population is very much denser than any part south of the Zambesi, and in many places is simply teeming, but figures can only approximate. However, placing it at a very low estimate of twenty-two to the square mile, this would mean a population of 6,160,000.

The country contains a magnificent network of waterways equal to any natural system in the world, both for purposes of navigation and irrigation. The Zambesi and its tributaries furnish over two thousand miles that are navigated at present by the natives, and can be used for commercial purposes. During a portion of the year canoes and flat-bottomed boats can pass from the Zambesi to the Kasai, a tributary of the Congo, and thence nearly eight hundred miles through a thickly populated country within the limits of the Congo free trade area.

Products

The products of the country, valuable to Europeans, are too numerous to mention, but a few of the most important, which are readily obtainable in great quantities, are as follows :

Vegetable Products

India-rubber. Caoutchouc of four kinds is known to the natives and taken to the coast for exportation.

Dyes of various kinds are known : brehilla weed is very abundant, indigo is also cultivated in many places, and some red and yellow colours are to be had in great quantities.

Guano of various kinds, useful in agriculture and the arts, is to be had for very little trouble.

Oils are obtained from several cultivated plants and trees and carried to the coast for shipment to Europe.

Cotton is very extensively grown and may be obtained in great quantities. It is long-stapled with a strong fibre. Cotton-cloth is manufactured by the natives in a small way.

Fibres of great length and strength are very abundant, and are largely made into cords and ropes by the natives.

Timber. Extensive forests of valuable timber are in all parts of the country. Some are many miles in extent, containing vegetable ivory, palms, ebony, lignum-vitæ, and immense quantities of beautiful varieties of mahogany and rosewood, and hard woods unknown in European markets.

Animal Products

Ivory. Elephants' tusks are bought from the king by traders and exported. As the king monopolizes all elephants' tusks and his people are not allowed to trade in them, the destruction of elephants is very small, about 5000 to 7000 lb. of ivory being the quantity sold annually.

The ivory of the hippopotamus, wild boar, rhinoceros, and crocodile teeth have not as yet been traded in, but can be obtained in great quantities.

Furs and skins of wild animals are to be had in large numbers, and a very profitable trade has been done in this line for many years.

Feathers. Marabou may be had in limited quantities. Ostrich wild-bird feathers are obtained from an adjoining territory.

Bees'-wax is very abundant and is sent to the coast for exportation.

Mineral Products

Gold exists in alluvial form and in reefs or lodes. About the end of last century large quantities of gold were obtained by one tribe of natives from alluvial deposits, from various parts of the country. They sold it to the Jesuits and Arabs of the east coast. A brisk trade was done for a time, but a war broke out which almost exterminated this tribe and caused the industry to cease. The old workings are still discernible, but no tribe has learned the art of washing the alluvium.

Auriferous quartz reefs exist in many places, but their value is unknown.

Silver is abundant and is found in a great variety of minerals. Some large deposits of argentiferous copper-ore are worked and smelted by the natives. The metal extracted, which is an alloy, is made into ornaments. Argentiferous galena exists in abundance, and native silver is sometimes found and melted into ornaments.

Cinnabar (sulphide of mercury) is found in a very pure state. It is quarried by the natives, and on account of its brilliancy of colour is used, mixed with fat, as a dye for the hair.

Tinstone is said to exist, but has not been made use of.

Precious Stones. Some ornamental and beautifully coloured stones are found and prized by the natives, but whether valuable or not is unknown. Diamonds are said to exist in an adjoining territory.

The Natives

The population consists of eleven tribes, each of which has its own characteristics. Some are noted as iron smelters and makers of weapons and agricultural implements. Others are smelters of copper and makers of ornaments. Several tribes are famed as wood-workers and makers of canoes, while others excel as river men, being able to navigate dangerous rapids with great skill. All are born traders, and are often known to travel hundreds of miles to trade with a few pounds of salt and cured fish. As agriculturists they are famous and are highly skilled in the art of irrigation, often damming up high streams and conducting the water for miles by channels to fertilize the lands. In intelligence they are vastly superior to any tribe south of the Zambesi, but (like all native tribes in an uncivilized state) they have little foresight and cannot realize the wealth that might be made by energy properly directed, the subject of supply and demand being quite beyond their comprehension. However, all tribes are excellent labourers, very willing and obedient, and glad of the opportunity to work for wages, which are as a rule paid in and represented by calico and their food for one month's work. In their own way they are quiet and industrious, ever making some article of use or ornament, such as hoes, knives, assegais, copper and ivory bangles, rude stone and woodwork of great variety, and excellent baskets and mats, many other articles

being made which show both skill and taste. Cotton-spinning and weaving are also carried on to a limited extent.

Food-stuffs are grown in immense quantities—maize, millet, dhura corn, &c. Cattle, sheep, and goats are also bred largely by most of the tribes.

Each tribe makes an annual tribute to the Chief Lewanika consisting (amongst other things) of articles of their own manufacture and sheep, furs, skins, &c. All ivory at present obtained is esteemed to be the king's own and forms the chief part of his revenue. With the articles of tribute and the ivory the chief buys such goods as cotton and woollen cloth, &c., the greater part of which he generally divides among the headmen and councillors.

Speaking generally, the natives of the Barotse Empire have qualifications which would constitute them a strong, thriving people, if only their abilities were trained to flow in a proper channel.

Commercial Development

Owing to the country being situated at a great distance from the coast and the difficulties to be encountered in travelling overland, it may be said to lie outside the reach of the ordinary individual trader. Occasionally a half-caste or native trader comes from the east or west coast to exchange various cloths and beads for ivory, but the only real trading which has been done has been by a few traders who have sent wagons of goods from the South by the Katuchara desert route, a long and tedious journey. The amount of trade that could be effected by this approach under the present circumstances must of necessity be very limited, owing to the fact that articles of exchange must be of first-class order (such as feathers, furs, &c.) to pay for the heavy expense of transport. This class can only be obtained in limited quantities, but the trade that could be done in a lower class of goods, such as cotton, india-rubber, timber, guano, oils, dyes, minerals, &c., in exchange for manufactured articles of civilization is practically unlimited. To carry on this profitably, it is absolutely necessary that some cheaper and more rapid mode of communication with the coast be obtained than the route in the southern parts.

The distance from the main stream of the Zambesi to the west coast is about six to seven hundred miles, over a country with many natural facilities of approach which could be made

easy to travel. There would be no difficulty in arranging with the Portuguese for a port on the west coast as an exit and entrance, and in establishing a number of stations for trading on the navigable streams and in places easy of access, which should be within easy communication with one or more central stations to receive goods from the coast and to dispatch those of exchange. If this were carried out with good distributive organization, a large and lucrative trade would be rapidly established, ever increasing with the success of the undertaking.

At the same time Forbes Julian drew up a carefully compiled paper dealing with the possible amount of trade during the first few years and the probable average quantities of some of the chief articles to be obtained. This was also dispatched to the Secretary of State for the Colonies.

It was discouraging to find that this correspondence with Downing Street produced no result. It was felt, however, by his friends that this journey earned for him the distinction of assisting in organizing the way for the developments afterwards achieved in these districts.

The Imperial side of the work had appealed forcibly to him, as it does always to those pioneers who are alive to any great advantages to be gained for the Empire—this vast inheritance committed to our charge—and amongst those who have essayed this task his name is therefore enrolled.

Cecil Rhodes also obtained similar concessions throughout the same districts, and was able to utilize these advantages in a manner that had been impossible to the young and unknown metallurgist. Fortunately, a cheerful, well-balanced mind prevented him from dwelling on this disappointment. Through his ancestry he had that invaluable inheritance of the Scot, the faculty of hard work, so at this juncture he turned his mind all the more resolutely to technical labours.

Perils by field and flood and the dangers of death

from fever or by the treacherous hands of natives were not the only risks that confronted him at this time. On returning from Kimberley to the neighbourhood of Johannesburg, he found that there was great fear of famine on the Rand.

He was again engaged with metallurgical work, but (as will be readily understood) many difficulties attended the labours of engineers during the early days of gold-mining in the Transvaal. From the very commencement the scarcity of native labour had been keenly felt. Until August 1892 there was no railway communication with the coast, and consequently all machinery and supplies had to be conveyed by oxen or mules, a mode of transport which was both tedious and expensive. The question of food-supply was most pressing, for in the autumn of 1889 the dwellers on the Witwatersrand were menaced by famine unless special efforts succeeded in the augmentation of existing supplies. It is estimated that the population then amounted to about forty thousand persons, of whom twenty-five thousand were white people and the remaining fifteen thousand were natives. The Government offered a bonus of £20 each to those who reached Johannesburg with the first two hundred and fifty wagons of food from beyond the Transvaal border. By this means, and by the aid and co-operation of the Natal Government, the crisis was averted.

The writer of an article in the *Rand Daily Mail* of Johannesburg for April 23rd, 1912, alludes in the following terms to the metallurgist's early labours in South Africa:

> Mr. Julian played a very important part in the opening of the gold industry, as in 1888–9 he introduced the Julian patent process for the recovery of gold from accumulated tailings. He built his plant at Tarry's yard in Kimberley, and it says much for his energy, as his huge tanks had to be

conveyed to Johannesburg by wagon transport. He subsequently served as battery manager to the Salisbury Company and the Wemmer Company, but his mind and attention were always devoted towards some new invention for the benefit of the industry.

The working methods of the first stage of the gold-mining industry on the Rand were based on the old-established lines of amalgamation and concentration. In the years 1890 and 1891, however, the gold-mining industry entered on what has been termed the second stage of its development by the introduction of the cyanide process. As Forbes Julian writes: "It was not until the year 1891, when a plant was erected at the Robinson Gold Mining Company to treat tailings by the MacArthur-Forrest process, that the treatment of ore by cyanide had crystallized into a form acceptable to the mining world. From that time it may be said that the cyanide process, which has proved such a phenomenal success, dates" ("Cyaniding Gold and Silver Ores," p. 6).

The great contribution that the mining engineers of Johannesburg have made to the world's industrial advancement is the successful application of the cyanide process, metallurgy in South Africa being practically covered by it. Although the mining methods used there are largely applications of principles practised in Australia and the United States, still in metallurgy the pioneers of the industry took up a process which in America had been discredited and almost abandoned.

The rapid development of the riches of the Rand forms a remarkable epoch in the mining history of the world. The vast natural wealth attracted men from all quarters of the globe, and a great cosmopolitan community very speedily settled in the Transvaal.

During the years 1890 and 1891 Forbes Julian interested himself in the application of oxidizers to cyanide solvents, making many experiments on the use of air blown through working solutions, and on the addition of more energetic oxidizing agents for facilitating the dissolution of gold in ores. He found that the results obtained were very encouraging, and in February 1892 protected his application of the use of air blown through the solution and of the more energetic oxidizing agents for this purpose by his Transvaal Patent No. 335. He continued experimenting with a large number of organic and inorganic oxidizers, the results obtained being best given in his own words :

" It was found that many are undesirable owing to their forming soluble compounds that increase the density of the solutions, and in some cases forming complexes with the cyanide of no value in the process. This increase of density has generally the effect of decreasing the solubility of the metal, by offering greater resistance to the diffusion of the dissolved oxygen molecules. It is therefore advisable, when employing oxidizers, to select one that introduces only oxygen or oxygen and water " (*op. cit.*, p. 79).

Having now spent several years in South Africa, he determined in the spring of 1893 to take a holiday and visit his relatives in England ; and the time passed with his father and sisters at their home in Lancashire was naturally a very happy period.

CHAPTER IV

SCIENTIFIC WORK IN GERMANY AND TRAVELS IN NORTH AMERICA AND EASTERN EUROPE

WHILST in Europe in 1893 Forbes Julian visited Germany and Austria, having accepted the important post offered to him of Technical Adviser to the German Gold und Silber Scheide-anstalt, at Frankfort-on-Main. His seven years of absence from Europe had embraced a period of strenuous endeavour, of long journeys by land and sea, and several exciting experiences. Feeling, however, that his metallurgical work needed confirmation and elucidation from experience in other mining centres, he determined during the summer of the same year to prolong his holiday by crossing the Atlantic and visiting North America.

Landing in New York, he journeyed across the continent to San Francisco, visiting Chicago, Salt Lake City, and several other important places on the way, and gathering at the mining camps all the information that he could pick up. The United States offered in this respect a splendid field for observation in connection with his work.

The tour was entirely successful in its leading object, but, keenly as he entered into the importance of these professional studies, the journey was chiefly memorable on account of the great enjoyment he derived from the beautiful localities visited. Not only the luxuriant vegetation of California, but also the magnificent scenery of the Rocky Mountains and

of the Great Lakes, aroused in him the warmest enthusiasm, as he viewed the precipitous heights and deep cañons of the Rockies and rambled on the beautiful banks and amongst the islands of the Lakes. He was also greatly impressed by the Hudson River with its noble colonnades of basalt, named the "Palisades."

Before leaving the American continent he made a tour over the Canadian border, delighting in the fine scenery, and interested in all he saw of the new cities being called into existence by British energy and perseverance. The Falls of Niagara were visited before concluding the journey. He was keenly impressed by their magnificence, and considered them grander, though less beautiful, than the Falls of the Zambesi, which he had explored a few years earlier.

During these travels Forbes Julian studied with close attention the political and social conditions in the United States.

He returned to Europe during the autumn for a brief visit to his family in England preparatory to his return to South Africa.

The long course of metallurgical work in the Transvaal had enabled him to appreciate the significance of all that had been seen in the American mining camps, and had greatly stimulated his scientific proclivities. The year 1893 was busy and eventful, for, in addition to the journeys undertaken in Europe and America, he conducted experiments on a large scale for the Frankfort Gold und Silber Scheide-anstalt; in South Africa at the Rand Central Ore Reduction Company's works in connection with the precipitation of the gold from cyanide solutions.

He continued to be closely engaged in metallurgical work, and in the following year, 1894, took out a

patent in the Transvaal for the use of cathodes made on the principle of those employed in galvano-plastic work. To use his own words :

> The cathode consisted of metallic or other surface, coated with a conducting substance. Thus iron coated with plumbago or waxed conducting substances were tried, the great advantage being that the bullion could be stripped off the cathodes and melted into bars without being contaminated with base metals. With rich solutions the process worked well, but when poor in bullion it became difficult to get a film deposited evenly, so that the effective electrode surface was diminished. Another cathode on the same principle was employed, which consisted of cotton or other fibrous threads or woven material, rendered conducting by one of the well-known methods. These passed over rollers up and down a number of times through each compartment of the precipitating box, using lead peroxide anodes. These threads were continuous in long lengths, and to remove the deposited metal they were drawn between rollers at the head of the box and cut off. A great advantage of this method is that a clean-up could be conducted very often, with only a short stoppage; and further, that the bullion obtained is not necessarily contaminated with other metals, as the bullion-covered threads have only to be smelted with borax and an oxidizing agent (" Cyaniding Gold and Silver Ores," p. 149).

In July 1894 he again set sail for Europe, leaving Cape Town by the mail steamer *Scot*, of the Union Line, and after a short visit to England took up his residence for some months at Frankfort-on-Main. The scene of his labours thus frequently changed from South Africa to Europe.

In 1895 a process patented by Johannes Pfleger was for a short time in use on a working scale in the Transvaal. Forbes Julian developed this process and worked it for three months on a full experimental scale on behalf of the Frankfort Gold und Silber Scheideanstalt, obtaining remarkably good and uniform results. His work in the Transvaal was carried on in sympathy

and co-operation with his German friends Herr Hugo Andreae and Herr Friedrich Stockhausen.

The Christmas of 1894 was spent at Frankfort, and he greatly enjoyed the Yuletide season there and the spirit of happy rejoicing with which the holy festival is always celebrated throughout Germany. Part of the following year was also spent at Frankfort, and in addition to South African journeyings his love of travel found vent in a long expedition which included Austria, Hungary, Transylvania, Roumania, and the borders of Russia.

He was shown great kindness in Germany and Austria by many of the metallurgists, chemists, and physicists of Frankfort, Berlin, and Vienna. His short sojourn in the Austrian capital was a period of most pleasant relaxation and enjoyment. His growing fame as a mining expert brought him into personal contact with many foreign scientists, and this was in every way advantageous to him, as in some cases the acquaintance ripened into friendship which grew stronger with recurring intercourse. This helped to broaden his views and strengthen his hold upon the scientific activity of his time, keeping him in touch with the foremost workers in more than one great branch of science, men who were constantly in the forefront of the endeavour of the age. At this period he laboured with energy at metallurgical problems, and, being endowed naturally with many of the essential characteristics of a genuine scientific worker, began to take an important place in the mining world. Accuracy and scrupulous regard for truth gave special value to his researches and to the carefully considered conclusions which he formed from them.

Received everywhere with friendliness and hospitality, he was enabled not only to study metallurgical

problems, but also political and social questions, and he spent many pleasant hours in the inner domestic circle of German families with whom he became intimate. Such friendly intercourse with foreign ways of life, in addition to the insight already gained into habits of thought in South Africa, and the views current in the great cities of the West, widened his sympathy for men and things abroad, and kept him from the insularity of outlook of which British people are sometimes accused.

To the great kindness and consideration shown by scientific colleagues and personal friends a piquant contrast was afforded by the overbearing manners of some officers in the army, which amounted to positive rudeness amongst a few of the younger military men. Displays of this state of feeling were witnessed by him not infrequently. On one occasion when having refreshments at a restaurant he happened to be sitting alone. Three young officers entered shortly afterwards and sat down at a table near him, at which a powerful, athletic-looking young man was already seated, the latter being dressed like an Englishman, but having the free-and-easy bearing which suggests a Colonial origin. The officers eyed him intently, and when he gave an order to the waiter in very poor German with a strong English accent all three burst into loud laughter. The young man's attention was concentrated on the waiter, from whom he was making inquiries about the locality. Seeing his head turned away from them, one of the trio knocked off the table a pair of gloves belonging to the stranger and lying by his plate. The latter turned round the moment afterwards, saw what had happened, and with rising colour, but without making any comment, stooped and picked up the gloves. The next time he gave an order the same thing was repeated. Forbes

Julian immediately crossed to the table, seated himself beside the young Colonial, and asked in English if he could assist him, not choosing to see a fellow British subject insulted. The stranger thanked him, and with great self-control, after again picking up the gloves, said quietly to the offender, "If that happens again I shall put you all three outside the door." Possibly the officers were slightly ashamed, perhaps they were overawed by the size and sinews of the young giant, or probably the appearance of his compatriot at the table turned the scale. The offending officer immediately apologized, saying he would not have played this practical joke if he had known it was an Englishman he was annoying, and the trio soon afterwards left the restaurant.

"You kept your temper admirably," said Forbes Julian. "Oh," replied the other, laughing good-humouredly, "I never like to be unpleasant, but I wished them to know they must not go too far." After a couple of hours spent chatting together, the stranger mentioned that he had only a short time for a tour in Europe and was leaving Germany in a day or two, and they exchanged cards before parting. Forbes Julian was amused to read on the one presented to him, "Mr. ——, of ——, Australia, Champion Boxer," and almost regretted that his new acquaintance had not taken the opportunity of showing his skill.

On another occasion he had gone one evening with friends to a public ball, and not being specially fond of dancing, was standing chatting with some acquaintance when their attention was directed to a lady who was dancing very gracefully with her son. The husband, a wealthy American business man, joined them, and soon commenced a conversation in English. An officer, who was apparently Master of Ceremonies

or a steward, now appeared, and, taking an unoccupied chair close by, began talking to them both in a patronizing manner, to their great amusement. All went well until the American lady and her son came to join them. At these dances there was a regulation that young people under sixteen years of age were not admitted. The following conversation then took place :

"That boy is too young to be here; he must go out at once," said the officer to the mother.

"Oh no! he is not too young," she answered; "he is just sixteen."

"That's a lie," replied the officer in a loud tone which could be heard all over the room.

Those who are acquainted with the high estimation in which Americans hold women will not be surprised that for this speech the officer found himself knocked off his chair, out of hand, by the enraged husband.

This caused an immense sensation. The idea of a German officer wearing the uniform of the Kaiser being struck by a mere civilian from the United States was a thing calculated to cause consternation in the Teutonic mind. The three Americans were soon the centre of an excited group, and the husband was charged with assault. The utmost that Forbes Julian could do for him was to assist in his being released later, on excessively heavy bail, even this concession being obtained only with difficulty. The husband was then enabled to join his wife and son at their hotel, but until the case came on they could not drive beyond the confines of the city. Eventually the millionaire had to pay an exceedingly heavy fine for his exploit, notwithstanding the fact that his wife had simply spoken the truth about the age of their son.

In the travels undertaken in Hungary, Roumania,

and Transylvania—the romantic "land beyond the forest"—Forbes Julian was fortunate in securing the companionship of a secretary who was a good linguist, and so able to act as interpreter in the country districts.

In the picturesque capital of Hungary they were received by some of the scientists of Budapest with true Magyar hospitality. In the course of their prolonged tour through the less known parts of Transylvania and Roumania they had often to stop at lonely wayside posting-houses, where little refreshment could be obtained except black bread and koumiss, a preparation of mares' milk. Whilst in the wilds they dispensed quite cheerfully with many of the comforts of civilized life, learning to be contented with food that might have been thought hardly passable elsewhere.

They were fortunate when no delays occurred at the posting-houses. On one occasion in Transylvania they arrived in the evening at a country village where a festival was being celebrated, and the innkeeper, his wife, and all the residents of the village appeared to be intoxicated with vodka, so that the travellers were perforce obliged to remain for the night and sleep at the inn. Even the next day it was difficult to get a meal and to obtain fresh horses, but after much loss of time and patience both were forthcoming. However, when Forbes Julian and his secretary arrived at any of the mining stations all difficulties vanished. They met with generous hospitality and kindness, and were assisted on their journey in every possible manner.

In all the larger towns visited there were tolerably good hotels, whilst the rough fare and humble lodging which were all that could be obtained in the poorer districts were no hindrance to one used to the hard-

ships and adventurous life of the South African veld, with all its varied vicissitudes of travel.

The labours that he had undergone during his wanderings over three continents were beginning, however, to tell on a constitution that had never been robust. Forbes Julian was rather below the medium height in person, slight and active in figure, with an alertness and energy in his movements clearly indicating the eager spirit within. While believing that hard work was injurious to no one, he had persevered in his undertakings long after his powers had become overtaxed. No constitution could stand such a strain for long.

Towards the close of the year 1895 he felt the necessity of taking a complete rest, and was looking forward to spending Christmas with his family in England, as his relatives were becoming alarmed at his continued ill-health.

The fatigue of his bodily exertions and mental labours during the past ten years had been severe, the rest taken being quite inadequate for the restoration of his health. He was habitually an early riser, but as he was frequently engaged with professional matters until a late hour, his working day was thus made far too long.

In the spring of 1896 he was still hoping to go out again to South Africa to continue the metallurgical work in which he took such interest, and for which he had so great an aptitude. But his health had now become seriously undermined, and he was prostrated by such severe attacks of pain and dyspepsia that he was reluctantly persuaded by friends to go to London with the object of consulting a well-known medical specialist.

The doctor's verdict prescribed absolute rest from professional work for a few years and residence in

some quiet place by the sea. The thought of even a temporary abandonment of his researches in South Africa came as a bitter disappointment to one who looked for happiness in work, especially after the additional experience gained in the United States and Central Europe, and the insight thus obtained into many matters connected with the science of metallurgy. His adaptability and self-reliance had proved important assets in new countries like South Africa and America (where mining work combines to a large extent with pioneering), and in all spheres wherever varying conditions confront the mining expert and circumstances force him to become a man who can face almost any eventuality.

During his three years' connection with the Gold und Silber Scheide-anstalt of Frankfort as their chief technical adviser on mining and metallurgical matters, he had conducted extensive researches which resulted in the introduction of far-reaching improvements in the recovery of precious metals from their ores. The fact that (like other mining experts) his work had led him to various parts of the world was very advantageous to him. But when such men are stricken down by illness and wasted by suffering they cannot secure proper treatment and nursing whilst engaged in developing the mines of new countries like South Africa, and this deprives the Empire of the services of many workers well fitted for such tasks.

The results of his labours were given to the mining world somewhat later in the volume "Cyaniding Gold and Silver Ores."

He was well qualified for the efficient performance of his various undertakings in South Africa, for, in addition to clear reasoning powers and scientific attainments, he had the gift of dealing successfully with large bodies of men. His self-chosen time of

assistance in his father's works had enlarged his fellow-feeling with labourers, for he had endeavoured to understand their lives and sympathize with their pursuits. He was able, therefore, to apply the experience gained in the North of England to the industrial communities of Kimberley and Johannesburg. And in his explorations in native districts he won the confidence of the black population, who found in him a man of rare sympathy and ready kindness.

He enjoyed the friendship of Dr. (now Sir L. S.) Jameson and his circle, but this did not prevent his acquaintance with many leading Boer families. Mrs. Rintoul (the sister of Commandant Mostert, of General Cronje's staff) wrote with the warmest gratitude of the attention shown to her husband in illness by Forbes Julian, who was never too busy to be kind. A strong vein of serious feeling ran steadily through all his actions, his conduct being guided by the well-known words, "I shall pass through this world but once. If, therefore, there be any kindness I can show, or any good thing I can do, let me do it now. Let me not defer it nor neglect it, for I shall not pass this way again."

Although towards the close of the nineteenth century, especially at the time of the "Jameson Raid," the social environment of South Africa had few neutral spheres or half-way houses as far as racial antagonisms were concerned, and it is probably true that this condition existed until very recently; yet (notwithstanding this) his genial personality appealed alike to Briton and Boer, causing him to be regarded as a good comrade, whilst he was recognized as being a patriot and Imperialist in the best and sanest sense of the terms.

He was spoken of by one of those fully qualified to judge as "one of the men best fitted by training and

experience to do good work in our Colonies, and of the type that has made Great Britain what she is amongst the nations of the world."

During this busy decade abroad he had risen from obscurity to eminence in his profession and from narrow means to affluence. The years had been full of courage, hope, and strenuous endeavour, every step of advance made having been conquered by patient labour.

In Germany he had been favoured by the friendship of some of those great scientists who were in the first rank of the thought and progress of the age; whilst in South Africa he had become acquainted with several men destined to play an important part in the drama of history amongst Briton and Boer alike, such as Cecil Rhodes, Dr. Jameson, President Kruger, and Dr. Leyds.

CHAPTER V

ENGLAND AND ITALY

HAVING thus been advised by his London physician to settle in some quiet seaside resort, Forbes Julian had now to resign for a time active professional work and fix upon a suitable place as his residence. After wandering about for some time with no definite plan, house-hunting in North Wales, the Isle of Wight, and other favourite localities, he was finally attracted by the West of England. Here he decided on "The Ness." a small country-house at Shaldon, opposite Teignmouth, which had been the marine residence of the late Lord Clifford.

The house was situated under the sheltered promontory of the Ness (from which it was named), on the wooded estuary of the Teign. The views obtained from it are very striking, terminating inland in the Dartmoor range of hills capped by the rocks at Haytor, and seaward in the beautiful coast scenery of South Devon and Dorset.

Forbes Julian came to Devonshire in the spring, when the county looks its best, the wide and sunny bay being at its loveliest and all sparkling with life and colour.

Directly he had decided on his future residence he became anxious to provide a home for his father and sisters in Devonshire, and soon afterwards two of his sisters, Lilly and Aimée Ethel, together with their father, came to live with him at Shaldon. Charles

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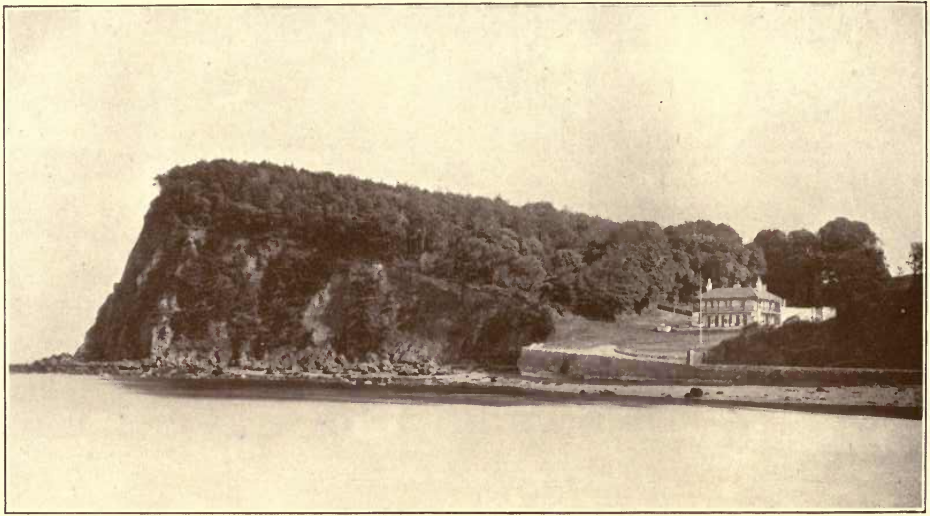

THE NESS, SHALDON

Julian, his only brother, was now in South Africa whilst his eldest sister, Emily, who had been at Newnham College, Cambridge, was head mistress of the Girls' High School at Tunbridge Wells. His remaining sister, Lucie, who had been studying at Oxford, was engaged to a Balliol man, Mr. William Davies, private secretary, first to the Marquis of Londonderry, and secondly to Mr. (now Viscount) Bryce, Chief Secretary for Ireland and ultimately British Ambassador at Washington.

Health was recovered very slowly, but the previous life of activity, for so many years without opportunities for recruiting strength, rendered it not surprising that Forbes Julian required a prolonged period for rest and recuperation.

It was during residence at Shaldon that he first came in touch with all the vigorous life and manly qualities of a seafaring people. His gardener Tipper, a retired naval pensioner and a deacon at one of the neighbouring chapels, became deeply attached to his master, as many of his actions as well as his letters clearly proved.

Bryant, another man employed at "The Ness," was also an old sailor and a sterling and valuable character.

Rallying with the change, Forbes Julian passed almost all the time out of doors, driving and boating. He was thus enabled, with returning strength, to enjoy the beautiful Devonshire lanes and to spend many hours on the water. He soon became proficient in the management of his boat under the assiduous tuition of Tipper, and enjoyed making trips with his neighbour Mr. Gray, who was a keen yachtsman.

The private beach at "The Ness" and the beautifully wooded grounds rendered it an ideal place in which to recover health and strength.

Although living very quietly, he made many friends amongst families in South Devon. Being a good shot and interested in motoring and boating, and fond, moreover, of horses and dogs, he was a congenial companion, with little of the typical scientist whose interests are confined to his own pet subject.

He frequently visited Torquay, where he had several friends, including Admiral Lindesey Brine, Colonel and Mrs. Brine, Mrs. Cole of Fell Court and her sons. These quiet years were not in any sense empty, but were amply filled with various occupations.

It was about this time that his attention was turned to motor traffic. He became one of the founders of the Royal Automobile Club, taking a keen and watchful interest in its early fortunes, and in motoring tours undertaken with the companionship of other members he was enabled to see a great deal of the beautiful scenery of rural England.

He also became a member of the Royal Horticultural Society, finding attraction in botanical studies, which he was able in this country district to prosecute successfully.

During his residence at Shaldon his sisters Lilly and Lucie both married. As their husbands were busy professional men, they could not in future be very much with him.

In 1898 he had the pleasure of a visit from some South African friends, Mr. and Mrs. Rintoul. The former, who had been seriously ill and under treatment at a nursing-home in London, speedily regained his health in Devonshire. He was of Scottish origin, and his talented wife had been a Miss Mostert, and belonged to one of the old-established Boer families of the Transvaal. Alluding several years later to this visit, Mr. Rintoul writes: "When we went to stay

with him at 'The Ness,' he had erected his laboratory, and was always engaged in scientific researches."

Some time after they left England there were rumours of threatened hostilities, and it will be readily understood that the outbreak of the war in South Africa in 1899 caused great concern to Forbes Julian, who had still several British and Colonial friends there in addition to Dr. Jameson, and, moreover, knew many of the combatants on both sides.

The following extract from a letter received from Mr. Rintoul gives an account of life in Johannesburg at the commencement of hostilities; his own brother was with the British army and his wife's two brothers were with the Boer forces, so that to him the conflict partook almost of the nature of a civil war. One of the chief tragedies of the Boer War was that so frequently families were broken up and love destroyed. Mr. Rintoul never became a combatant himself, but rendered assistance in connection with hospital work to the wounded on both sides.

JOHANNESBURG,
8th Oct., 1899.

. . . It would take pages to describe to you the excitement which has prevailed in Johannesburg for the past three weeks, but I suppose you get all the news in the papers, and I will content myself by just giving a few minor details.

The Burghers were all called out a fortnight ago, and willingly responded to the call, and even at the present only mounted men can be seen in the town. The mines are all closed down, with the exception of the foreign groups, and these are being worked by miners and workmen of the nationality with which the mine is connected. There has been an enormous exodus both of whites and blacks, and the discomfort attending the former during the last fortnight in travelling must have been terrible. The men had to be contented with coal-trucks without a covering, and as this is our rainy season, their discomfort can be more easily imagined than described. . . .

All the stores and private houses are barricaded with iron and wood, but this does not prevent private houses being broken into and the contents stolen by the large number of roughs who (as you know) are in Johannesburg. Furniture has been taken by these folk from unoccupied houses in the broad daylight, and as most of the police have been called out nothing can be done. All the bars, hotels, and even the clubs are closed by order of the Government, and a drink is not obtainable at any price. The British companies have removed their head offices to Cape Town and Durban. In comparison with the desolated appearance of the town caused by barricading, there is a large amount of bunting displayed from the various foreign houses. . . .

I am applying for a permit to remain and to do the ordinary police duty, which must be done by all those who receive such permission. I don't half like it, but we really cannot go away, and come what might, we must stay. . . .

Another letter, although received much later from a friend whose son-in-law had been one of the heroes of the Mafeking district, may fitly be inserted here.

My wife and I would be greatly pleased to see you again. Last Thursday our second daughter married Captain ———, who was a terror to the Boers north of Mafeking, for in fifteen months ending last June, when he was invalided home, he trained his company of South Wales Borderers as Scouts and made them good shots on horseback. During these fifteen months he never had more than two hours' sleep at a time, and that mostly in daylight, as he was scouting all night. He took so many prisoners that at last he scattered notices over the veld: "———'s Scouts take no prisoners." After that the Boers gave him a very wide berth. He did not lose a single man of his command, and he had some three hundred men under him. He knew the veld well, having fought in the Lancers in the Matabele War, and then gone after big game.

In January 1900 a break occurred in the home life through the death of his father, Mr. Henry Julian,

who at the time of his last brief illness was staying with one of his married daughters, Lilly Unsworth. Although he died in his seventy-third year, and had thus reached a good old age, his death came upon the hearts that loved him with all the shock of unexpectedness and a keen sense of bereavement.

In order to obtain further benefit to his health by change of air and scene, and to avoid the English winter, Forbes Julian twice paid visits to Italy towards the close of the nineteenth century, delighting in the wonderful scenery, the beautiful sky, and magnificent climate.

At Florence, where he stayed for some time, he had the advantage of frequently meeting his sister's friend, Miss Helen Zimmern, the authoress of "The Last Days of Papal Rome," who was a noted lecturer on Dante and well known to the British Colony at Florence. Through her kind introductions he met many compatriots and Italian families, as well as visitors of other nationalities, who were staying at the famous and cosmopolitan City of Flowers. Not only did the beauties of nature attract him strongly, but also the artistic works of man, such as the statues and pictures. He was himself a fine draughtsman, and soon became absorbed in these studies, visiting the famous galleries and churches with much enjoyment, as well as exploring many lovely scenes in the valley of the Arno. His artistic tastes were greatly stimulated by these Italian visits, and he became thoroughly conversant with the magnificent cathedral designed by Arnolfo, whose great work was "crowned by Brunelleschi's wonderful dome and shadowed by Giotto's matchless bell-tower."

CHAPTER VI

MARRIAGE

THE nineteenth century closed in gloom, for Great Britain had still her hand on the sword and was engaged in the protracted struggle with the Boers in South Africa. Thoughts of war, of mourning, and of bitter bereavement filled the land, and before the first month of the New Year had passed away the country was further saddened by the death of Queen Victoria, who for so many long years had held the affectionate admiration and esteem of all classes of her subjects throughout the Empire.

The twentieth century was soon, however, to unfold the hope of an early settlement and to usher in the reign of the brilliant and beloved King Edward the Peacemaker. Amidst these great events minor changes were in progress, the results of which were profoundly to influence the life of Forbes Julian. Amongst these was one which occurred in the West of England. The Right Rev. Herbert Ryle, of Cambridge, had succeeded Bishop Edward Bickersteth in the Diocese of Exeter, and his enthronement took place early in 1901. It was at Torquay, just after her return from Exeter, where she had witnessed the enthronement of the new bishop, that Forbes Julian first met his future wife, Hester Pengelly.

The intimacy soon ripened into friendship, and the friendship into affection. She shared his love of science and travel, they had many other tastes in

Photo by Lafayette, Dublin

HESTER JULIAN

common, and, like him, she had suffered the loss of both her parents. She had been educated at private schools at Torquay and Clevedon and at the Ladies' College, Cheltenham, completing her education at home by studying mathematics and geology with her father. Afterwards she became a member of the Geologists' Association, the Royal Anthropological Institute, the Dante Society, and other institutions, in all of which Forbes Julian was interested—especially the last named, as during his visits to Florence he had become a student of the works of Dante.

His health was now re-established, and he had previously intended returning to South Africa in 1901, but the prospect of marriage led him to abandon the idea of leaving England. During the spring of 1902 the engagement was announced, and gave great pleasure to their relatives and intimate associates.

The earliest friend to send him congratulations was Sir Vincent Barrington, while Mr. and Mrs. Rintoul wrote from Johannesburg sending their best wishes and expressing the hope that they would be able to attend the ceremony.

Forbes Julian's future wife was the youngest daughter, by his second marriage, of the late William Pengelly, a distinguished scientist and a Fellow of the Royal Society, who by his explorations of Kent's Cavern was specially identified with the geology of the Torquay district. He was well known also as the founder of the Devonshire Association and the Torquay Natural History Society, and it was in virtue of this connection with Torquay and of Hester Pengelly's love for her old home that Forbes Julian resolved to settle permanently in that town.

By his six years' sojourn at Shaldon and by his ten years' residence at Torquay he became a naturalized Devonian, and was soon warmly attached to his

adopted county. Indeed he always spoke of those years as the happiest period of his life. The impressions of nature which he had gathered as a child from his home in the picturesque district of the South of Ireland were deep and lasting, but his love for the rich and beautiful coast scenery of Devonshire and for the home of his married life was deeper still and more abiding.

In allusion to this affection for the West Country, his old friend Mr. Sulman, the well-known metallurgical chemist, who often met him in London, writes: "We constantly lunched at the Mining and Metallurgical Club together, where we had many a long talk on matters which mutually interested us. The hour seldom passed without a reference to his home at Torquay and the charm that this lovely corner of England exercised over him."

The summer of 1902 brought the cessation of the South African War, and the blessings of peace slowly emerged from the dark clouds that had hung over the British Empire, and this seemed a happy omen for their engagement.

Not long before their marriage he and his future wife were present in August on the occasion of the procession of the King and Queen to and from Westminster Abbey for the Coronation. This singularly impressive spectacle they witnessed from the windows of Whitehall with his sister Lucie and her husband, Mr. William Davies, who was at that time private secretary to Lord Londonderry. Added to the stately pageantry of the ceremonial was the pathos of the scene; the King, just given back to the prayers of his subjects after his severe illness, was a dignified yet touching figure, and the thoughts of all were centred on him and on his consort. Great sympathy was also felt for the aged and infirm Archbishop, and

by none more keenly than by Hester Pengelly herself. Dr. Temple, when Bishop of Exeter, had been a valued friend of her father.

During September Forbes Julian was occupied in removing from Shaldon to Torquay, "The Ness" having been partially burnt down, an occurrence which caused him great inconvenience and pecuniary loss. It happened during his absence on a visit to London that one evening, just before midnight, his beautiful home had been found to be ablaze, the fire having started in the kitchens. Tipper the gardener, with all the ready resource of an old sailor, rendered valuable assistance, with the help of the coastguardsmen, in saving many papers and writings from the burning wreck, and telegraphed to his master, who at once returned. It was a severe shock to see only the blackened ruins of his beloved home; it was also a sad uprooting, enforcing the obligation to settle elsewhere. It was, however, a matter of consolation to him to know that no servant nor other inmate of the household had suffered harm.

The conflagration occurred about the time of his engagement, and although "The Ness" was soon rebuilt, he decided on making his chosen home at Torquay, and quickly adapted himself to the new and narrower surroundings, for "Redholme," his villa residence there, had only a small garden instead of the beautiful grounds which had afforded him such pleasure in the country district of Shaldon.

Amongst those who took much interest in the approaching marriage in October and wrote regretting their inability to be present at the ceremony on account of the long journey to Torquay, were Lord Lister, Lord Avebury, Sir Robert and Lady Ball of Cambridge, Sir John and Lady Burdon-Sanderson of Oxford, Sir Archibald Geikie, Professor Harley,

Professor Sayce, the Rev. J. O. Bevan, Mrs. Martin Donohoe, and other old friends of the bride. Likewise Bishop Welldon was to have been present to take part in the service, but was prevented by absence in South Africa.

A few short extracts from some letters she received may be inserted here, the first being from Bishop Welldon, written from Little Cloisters, Westminster, on August 29th, 1902 :

. . . I hardly see, now, how I am to be present at your wedding if I go to the Cape, though it is a pain to me to say so.

I shall be in residence here until the end of September, I have made engagements for the three first days in October, and I hope to sail on the 4th. . . .

But I do not yet look upon my going as certain.

. . . Will you accept from me this present (of volumes of the works of Shakespeare) as a sign of my interest in your approaching marriage, and of my regret that I may not be able to be present at it if I sail for South Africa before the date of your wedding ? I pray that many years of happiness and usefulness may be granted to your husband and yourself. . . .

Lord Lister wrote on October 2nd as follows :

. . . It is very kind of you to wish that I could attend your wedding. . . . It is impossible, I greatly fear, to get away to Torquay this month, and therefore for me to be able to be with you on the occasion, but you have my heartiest good wishes for your happiness, my dear Hester. . . . It is extremely kind of you and Mr. Julian to invite me to Torquay. . . .

Lord Avebury wrote from Farnborough :

. . . Thank you for the kind and interesting invitation. We should be very glad indeed to avail ourselves of it if we are in your neighbourhood. . . . I am extremely glad to hear that they have put up the Hall in memory of your illustrious father, my dear old friend. . . . We send all good wishes. . . .

Lady Burdon-Sanderson sent the following letter from Oxford on October 8th :

. . . Accept my warm congratulations on your engagement. . . . I heartily congratulate Mr. Julian, because I know what good qualities reside in his fiancée, and I have no doubt when I have the pleasure of making his acquaintance I shall quite justify your choice. . . . I am sorry that we cannot hope to be present at the wedding. I expect to be in the north at the end of this month, and Sir John has engagements in Oxford. . . .

Writing from Edinburgh, Professor Sayce says

. . . I am very sorry that I cannot have the pleasure of a talk instead of being dependent on pen and paper. But I have left London and, as you will see from my address, am now settled in the north. Indeed I have been further north than Edinburgh, for I have been lecturing at Aberdeen. . . .

Let me congratulate you on the news your letter contained. I hope that you will have nothing but happiness and prosperity in the new life that awaits you. . . .

I wish we had a little of your warmth here—we are still in the glacial age. I send all good wishes. . . .

Mrs. Martin Donohoe (wife of the war correspondent) wrote from London on October 29th :

I am thinking much of you and shall be thinking of you to-morrow, the day which is to mean so much to you.

When this reaches you the ceremony which makes you and Mr. Julian one will be over. I pray that the union may be fraught with the greatest happiness to you both and that you, dear Hester, may be able to look back on your wedding-day, as I and all other happy wives do, counting it the most blessed day of your life.

That all good may attend you in the new time dawning for you is the prayer of

Your affectionate friend.

The marriage of Henry Forbes Julian and Hester Pengelly was solemnized on October 30th, 1902, at

St. Mary Magdalene (Upton) Church, Torquay, the ceremony being performed by the Rev. Canon Edmonds, Chancellor of Exeter Cathedral.

The bride's elder sister, Lydia, held a reception after the marriage service, which was attended by a large circle of relatives and friends, at the "Pengelly Hall," the building erected as a memorial to their father, which is referred to in Lord Avebury's letter.

The wedding tour was spent in Cornwall, chiefly at Launceston and Tintagel, the travellers being greatly impressed by the scenes so eloquent of history and redolent of antiquarian interest and natural beauty in this picturesque district of the west. Before Christmas they were settled at their home in Torquay, where they had a most hospitable reception from families of the neighbourhood. Although there was much that was congenial in this friendly intercourse, still the various engagements of social life formed hardly employment enough for an active temperament, and were merely pleasant interludes of relaxation amidst more serious occupations. Forbes Julian soon joined the Devonshire Association and the Torquay Natural History Society, the two local institutions founded by his late father-in-law, and served the latter as a member of committee, communicating papers after his election and lending a helping hand in various ways to assist in bringing the Society more prominently forward. He also joined the British Association for the Advancement of Science, and some of the societies in London to which Mr. Pengelly had belonged. This brought him into friendly intercourse with leaders in various branches of learning with whom he had previously been unacquainted owing to his long residence abroad and the quiet country life he had led since his return to England.

Of the man whose scientific activities were thus

destined to have so far-reaching an attraction for his future son-in-law and to affect his way of life in many ways something should now be said, in order to throw more light on the influences with which Forbes Julian came in contact, by his marriage and residence at Torquay, and the family and friends of his wife and the surroundings in which she had been brought up.

William Pengelly was born at East Looe, in Cornwall, and by descent came from a long line of seafaring men of courage and adventure. His father, Richard Pengelly, was a Cornishman and the captain of a vessel, whilst his mother was a Prout of the same family as Samuel Prout, the celebrated artist.

When only twelve years of age the future geologist left school for ever and began his life at sea on the vessel commanded by his father. The death of his only brother made his mother anxious about her sailor boy, and he gave up his seafaring life and returned home at the age of sixteen.

A few years later he removed to Torquay, where he opened a small day-school and commenced his career as a schoolmaster and lecturer, rendering high service to his generation and giving indirectly a powerful impetus to the whole system of scientific thought in the south-west of England. Shortly after settling in Torquay his attention was turned to scientific studies. His interest was soon thoroughly awakened, and he prosecuted his geological researches with enthusiasm, working assiduously at the rocks and fossils of Cornwall and Devon, in sympathy and correspondence with Hugh Miller, Charles Peach, and many distinguished contemporaries, including Sir Roderick Murchison, Dr. Bowerbank, Professor Huxley, Sir Charles Lyell, Sir Richard Owen, Professor Sedgwick, Professor Milne-Edwards of Paris, and other leading scientists.

Assisted by Mr. Vivian, Dr. Battersby, and a few

other friends, William Pengelly founded the Torquay Natural History Society in 1844, it being largely due to the untiring efforts and never-abating energy of the young geologist that its success was ultimately secured. He was unwearied in his work of contributing to its permanent usefulness by lectures, by papers, and by gifts of fossils, and for nearly forty years of his active life he was the hard-working and indefatigable honorary secretary of the institution. The museum collection is of unique value and of surpassing interest in illustrating the antiquity of man, as evidenced by the geological deposits rescued from Kent's Cavern by his disinterested labours.

His private pupils had become so numerous about this time that he finally gave up his school and became a tutor of the natural sciences, his services being called for by very illustrious families, the Russian Imperial family amongst them, and by members of more than one other Royal house.

Although he was now contributing geological papers to different scientific societies, it was more as a lecturer than as a writer that his activity was manifested. As his reputation grew he frequently lectured at the Royal Institution in London, at the Universities of Oxford and Cambridge, at Manchester, Liverpool, Birmingham, Glasgow, Dundee, and most of the other large cities in England and Scotland. At Torquay his gratuitously given winter courses on geology attracted crowded audiences. As a natural science lecturer he placed his ever-growing knowledge unreservedly at the disposal of the many, and was ineffectually remonstrated with when friends urged that he could not afford to be always working without fee. His letters from famous workers in the same field show how opinions were matured on questions of geological difficulty or doubt, whilst his published

correspondence with his friend Sir Charles Lyell proves what influence William Pengelly's experience and philosophical acumen had on the establishment and progress of geological science, and that he was an adviser in whom the author of "The Principles of Geology" and "The Antiquity of Man" placed a large and generous confidence.

About the same period he formed two of the other great friendships of his life, with Canon Kingsley and the late Lord Lister—friendships to be severed only by death. He and Charles Kingsley had many scientific and philanthropic interests in common, which rendered the tie between them unusually strong. Joseph Lister's scientific researches also and the earnestness of his efforts to relieve human suffering greatly endeared him to William Pengelly, creating a warm friendship between them, an attachment which grew stronger by recurring intercourse. "I cherish his memory with affectionate admiration," wrote the great surgeon in a letter to the present writer after William Pengelly's death; "what a comfort that his love of science never undermined his faith as a Christian."

His first connection with the Society of Friends came through friendships with the Burlinghams, the Listers, and the Fox family of Falmouth, for they all belonged to the Society, and in middle life he made the acquaintance of Mr. Spriggs, to whose youngest daughter, Lydia, he became attached.

He had been a widower for some years, and in spite of the difference in age his second marriage added greatly to his happiness, for in all his undertakings he was now sustained and encouraged by the loving and ever-ready help of his young wife.

Her family had been members of the Society of Friends for several generations, her great-aunt being

remembered as the young Quakeress Hester Savory, on whose death Charles Lamb composed his well-known poem "To Hester." William and Lydia Pengelly's youngest daughter, the present writer, is her namesake. The geologist was a well-known member of the British Association for nearly forty years and was present at most of the gatherings during that period, being soon placed on the General Committee of the Association and also on the Council. In 1877 he held the Presidency of the Geological Section at the Plymouth meeting, and he presided over the Department of Anthropology at the meeting at Southport in 1883.

The Baroness (then Miss) Burdett-Coutts frequently visited Torquay, and her friendship with Mr. and Mrs. Pengelly commenced just after their marriage. They were often her guests both in Devonshire and in London, being invited to meet the Prince of Wales (afterwards His Majesty King Edward VII), the Duke and Duchess of Teck, and many other Royal and distinguished persons, at her house.

Soon after his second marriage the geologist entered on that special sphere of research in which he was to rise to eminence, for his detailed excavations in the Devonshire Caves commenced in 1858. It was in that year that the Windmill Hill Cavern was discovered at Brixham. Its thorough investigation was undertaken by the Royal and Geological Societies through a committee of which he was a member, the actual superintendence falling entirely on him. These researches and those undertaken later at Kent's Cavern were gratuitous; he was rewarded indeed, not with money, but by discoveries of the utmost significance.

Writing of the work at Brixham, Professor Bonney, the well-known geologist, states: "The results proved that in Devonshire a race of men in a low state of

civilization had been contemporaneous with a fauna which has now disappeared from Britain and in some cases is actually extinct."

The eminent authority on cavern excavations, Professor Boyd Dawkins, also writes: "The exploration established beyond all doubt the existence of Palæolithic man in the Pleistocene Age, and caused the whole of the scientific world to awake to the fact of the vast antiquity of the human race."

The question of the antiquity of man was warmly debated at the meeting of the British Association at Aberdeen in 1859. Here we are carried back to the atmosphere breathed by Lyell, Murchison, Owen, Phillips, Huxley, and Ramsay, and with their help William Pengelly fought for the infant doctrine against all the forces of bigotry and intolerance. It is mainly due to their efforts that more enlightened opinions are now held. It was a steady light replacing the gloom. He was one of the earliest converts to the theory of creation by evolution as well as a champion of the doctrine of the antiquity of man, and he laboured as a pioneer of that doctrine through all the burden and heat of the battle.

The Presidential chair of the Association at Aberdeen was filled by the Prince Consort, and during the progress of the meeting the geologist was one of those members who received a gracious invitation to Balmoral from Queen Victoria and Prince Albert. Many years later Mr. Pengelly had the honour of receiving a visit at his residence, "Lamorna," Torquay, from Her Majesty's grandsons, Prince Edward and Prince George of Wales.

The ex-Emperor Napoleon III, with the Prince Imperial, Prince Murat, and also the Queen of Holland, visited him at "Lamorna" on other occasions, and manifested much interest in the fossils and scientific

specimens. The Grand Duchess Marie, sister of Alexander II of Russia and widow of the Duke of Leuchtenberg, was another frequent visitor at Torquay, and her sons studied several branches of science with Mr. Pengelly, becoming much attached to him. Prince Nicholas, the eldest of the princes, made great progress in geology, and was afterwards appointed by his uncle, the Tsar, Inspector of Mines in his dominions. The Prince and Princess of the Netherlands, with their daughter, the Princess Mary, also came to Devonshire, and asked William Pengelly to read geology with the young princess, the latter being so anxious to have his instruction that she agreed to take her lessons before eight o'clock in the morning.

A well-known geologist writes: "The unremitting and gratuitous labour which Pengelly for many years devoted to the exploration of caverns met with a reward of a rather unusual kind. In maturer life he was positively courted by all ranks of society, from queens and emperors downwards. The simplicity of his tastes, of his mode of living, and of his general demeanour was never spoiled by the flattery, direct and indirect, of which he was so frequently the recipient."

His pupils included all ranks, from the prince to the peasant, for he started classes for working men and boys, whom he taught gratuitously at a night school after his hard day's work. During the year 1860 he completed the formation of a valuable and representative collection of Devonian fossils, which, under the name of the "Pengelly Collection," was presented to the Oxford University Museum in connection with the Burdett-Coutts Geological Scholarship.

The investigations of the Bovey Tracey deposits were also undertaken, and concluded by him early

in the sixties. His scientific colleagues considered that this systematic examination of these deposits was of exceptional interest, and induced him to communicate a paper to the Royal Society on the work. It was entitled "The Lignites and Clays of Bovey Tracey," and was supplemented by an account of the Fossil Flora of Bovey Tracey from Dr. Oswald Heer of Zurich, the eminent palæo-botanist.

Not the least of Mr. Pengelly's services to his adopted county was the foundation of the Devonshire Association for the Advancement of Science, Literature, and Art, an enterprise in which he received great assistance from Sir John Bowring, Mr. Brooking Rowe, the Rev. W. Harpley, and other intimate associates. The first meeting, held at Exeter in 1862, proved remarkably successful under the able presidency of Sir John Bowring. One of his successors in the "chair," in 1871, was the founder's intimate friend, Canon Kingsley. The Association took firm root, and has now continued to flourish for half a century. In 1872 another of his friends, Archbishop Temple, then Bishop of Exeter, presided at the second meeting held in his own cathedral city.

The last and best-known scientific work undertaken by Mr. Pengelly, and the only one remembered by the present writer (who was the youngest child of his second family), was the exploration of Kent's Cavern, Torquay, which was not completed until 1880, having occupied between fifteen and sixteen years. The exploration commenced on March 27th, 1865, and was concluded on June 19th, 1880.

Professor Boyd Dawkins writes thus of William Pengelly's labours:

> Day by day, except when the work was stopped, he visited the Cave, and recorded on maps and plans the exact spot where each specimen was found, for no less than sixteen years.

The vast collection of palæolithic implements and fossil bones, each of which bears traces of his handiwork, is represented in most of the museums in this country, and the annual reports, listened to with so much pleasure by crowds at the meetings of the British Association, are the most complete that have ever been published.

He willingly abandoned all thought of wealth or advancement in life so as to prosecute these researches successfully, and devoted about five hours daily to the cavern work, a rare instance of devotion to science on the part of a man who was not in independent circumstances, and had to gain a livelihood by lecturing and teaching, for it was only through an inheritance that came to his wife that his later years were passed in affluence.

Amongst those who took much interest in the Cavern exploration and honoured William Pengelly by visiting him at "Lamorna," Torquay, and inspecting his geological collections, was (as already stated) His Majesty the King, then Prince George of Wales. On that occasion the present writer remembers that Prince George was specially interested in viewing the bones gnawed and split by hyænas and the flint implements found in the Cave, being reminded of similar specimens inspected in the Museum at Copenhagen. The Prince was very anxious that Mr. Pengelly should see the latter. The geologist had several friends amongst Scandinavian professors, and he long cherished the hope of visiting the Danish capital and examining the anthropological collections there, but unfortunately this wish was never gratified.

After William Pengelly's death, which occurred in 1894, Professor Bonney wrote:

Full of years, much beloved, and with his scientific work widely recognized, he has gone to his rest. It will be long

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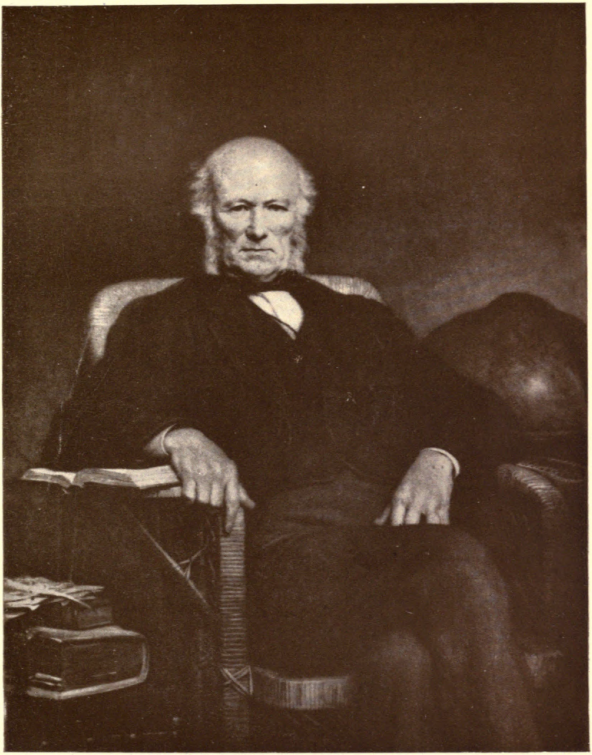

A. S. Cope, Pinxt.

WILLIAM PENGELLY, F.R.S.

before this work is forgotten, for his name is inseparably linked to the history of caves and the annals of primæval man.

His scientific work did not interfere with his other activities; if he studied ancient times and primitive man he did not lose touch with contemporary life and thought. Music, politics, temperance, all interested him and claimed his sympathies. For more than half a century he laboured unflinchingly to advance the bounds of human knowledge, and he was no less staunch to his friends. His first thought was ever the instruction he could afford to others, the last consideration the personal benefit he might derive for himself.

The Jubilee of the Devonshire Association, founded by Mr. Pengelly, was celebrated in 1912, the year Forbes Julian started on the *Titanic*; and at the request of some of their friends his wife had written this little sketch of the founder, which had interested him and engaged his attention on his last day at home, and it was thought, therefore, not out of place to insert it with this memoir.

This estimate of William Pengelly's work and influence on Devonian thought and science has accordingly been given at some length because of the special connection with Forbes Julian, who during the last decade of his life, by his change of residence and interest in his late father-in-law's studies, became closely associated with many of his scientific undertakings.

Facts have an additional interest when told in relation to a personality, and an account of the metallurgist's new connections helps to make plain some of his subsequent interests and activities, but in the midst of these miscellaneous occupations he did not forget his old and favourite science. Although, in

prospect of his approaching marriage, he had in 1901 relinquished the thought of returning to South Africa, yet an active worker was unlikely to remain long idle; he was again eager for employment, and was now engaged in the preparation of a scientific text-book, of which an account must be given in the succeeding chapter.

CHAPTER VII

PUBLICATION OF WORK ON "CYANIDING GOLD AND SILVER ORES"

THE text-book which Forbes Julian was preparing with the collaboration of his colleague, Mr. Edgar Smart, was a treatise on cyaniding. The two friends had commenced the work in 1901, and their correspondence shows how the difficulties of joint authorship were overcome.

Mr. Smart had been out in Australia since the old days of their friendship in the Transvaal. He had been in England during 1901, but returned to South Africa at the close of the Boer War.

It was at first intended that he should write the mechanical part, and that Forbes Julian should supply the chemical portion in the work, but it was soon felt that such a plan would hardly give the best results.

Writing from London early in 1901, Mr. Smart invites his colleague's criticism on a sample chapter. He says :

> . . . Enclosed with this I am sending you a sample chapter in the rough before putting on any literary polish, to see whether it meets your views. Please criticize it destructively quite regardless of its parentage, and, if you will allow me, I will do the same for your part as far as my ignorance of chemistry will allow. As you said, writing a book is the best means of learning a subject. . . .

And in a later letter he wrote :

LONDON,
5th April, 1901.

. . . As it does not seem feasible entirely to separate the chemical and mechanical portions, and if we were each to write our portions apart there would be a difficulty about the subsequent jointing; and, secondly, as it does me good to write chemistry even if occasionally marred by false doctrine; and as, thirdly, you have not so much time to spare as I have at present—I submit that the best plan will be for me to write as completely as possible, putting in all I know and can gather, so that you can then remodel the work, cutting out those things that be unseemly or untrue, for which you can substitute your own knowledge. Then, when each chapter is thus complete, it will be comparatively easy to see which sequence of the chapters will be most natural and instructive.

It was on lines such as these that the work was ultimately accomplished, occasional reference being made to friends when it seemed advisable to consult them on specific matters. Amongst those who helped in this way may be mentioned Mr. J. E. Clennell, a colleague of the South African days, who was then living in London.

By the end of 1903 the book was completed, and was published early in 1904 by Messrs. Charles Griffin and Co. Ltd., under the title of "Cyaniding Gold and Silver Ores." The volume was of nearly four hundred pages, with abundant illustrations, numerous working drawings in the text, and thirty-four folding plates. The appearance of this work marked a stage in the history of cyanidation, for it was of great use to scientists and also to practical men. A very favourable reception was accorded the book not only by metallurgists but also by mining journals and other scientific publications, but any adequate review of the work must of necessity lie wholly beyond the range of the present biographical sketch. A slight account,

however, should find a place in this memoir, and as it seems advisable to adduce independent testimony, some extracts from lengthy reviews which appeared in *Nature* and the *Athenæum* may be inserted. The extracts in question give the following summary of the subject and an appreciative estimate of the way in which it had been treated.

In *Nature* for January 26th, 1905, we read:

The Cyanide process is still in its teens, but it is a lusty stripling. Much of the enormous increase in the production of gold during the last few years is due to it either directly or indirectly. There are few gold-mines of any importance in the world at which the process is not installed, and it has been stated on high authority that the majority of these mines could not earn profits and pay dividends without its aid. Owing to the shortness of the time since the industry of cyaniding gold and silver ores began to spring up, there is a lack of data on the subject readily available to men at work far from centres of civilization. There are many books on the cyanide process, but new ones are still welcome, particularly a book like that of Messrs. Julian and Smart. . . .

The authors were well equipped for their task, both having been engaged in the industry for a number of years. They have not, however, merely written down the results of their own practical experience, a course which usually leads to dogmatic assertions on doubtful points, but, on the contrary, have studied the voluminous literature of the subject with evident care. . . .

. . . The book begins with an interesting . . . chapter on the early history of the cyanide process. The authors next proceed to describe the laboratory experiments which are necessary to determine the method of applying the process to any particular ore. . . . The later chapters, dealing with the methods and machinery used in practice, form by far the most useful and interesting part of the book. The authors seem to be quite at home in describing the design and construction of leaching vats, precipitation boxes, pumps, launders, sizing plants, and all the accessories of a modern cyanide mill.

The methods of treating different classes of material are also handled with skill and judgment. . . .

The book ends with a couple of excellent chapters on the cost of constructing plants and of treating ores. . . .

. . . And enough has been said to show . . . that those interested in the cyanide industry cannot do without it.

In the *Athenæum* (August 27th, 1904) it is stated:

The smaller the amount of gold present and the finer its state of division, the more necessary it becomes that as little of it as possible should be wasted in extracting it from the matrix or ore in which it lies imprisoned. The coarse, mechanical washing, which was permissible—and paid—in the happy old days of placer workings, had very early to be supplemented by the use of mercury. When hard, unyielding reefs came to be attacked, even the richest, the expense of crushing, and of otherwise preparing the ore for amalgamation, caused many refinements of that process to be resorted to in order to lessen the leakage.

Now the chief stores of gold are of the "low grade" type in which the minute percentage of the precious metal in imperceptible particles is only compensated by the comparative uniformity of its dissemination—as in the "banket" deposits of the Rand. The gold which one can afford to lose is thus reduced to its very minimum, and amalgamation alone, however carefully carried out, is no longer equal to its task.

Chlorination has therefore been tried, with more or less success, but it involves the preliminary process of roasting the ore, and to multiply operations means a reduction of profits.

A further step, and one that has proved extraordinarily effective, has been the adoption of the cyanide process. Essentially this process is simple enough. It may be described as the treating of the crushed ore with a dilute solution of potassium cyanide (an expensive and highly poisonous substance, unfortunately) exposed to the oxygenizing influence of the air. The gold is dissolved and afterwards precipitated from the solution by means of zinc turnings or by electrolysis.

To compare this bald statement with the excellent work before us—four hundred pages full of accurate and needful information, with elaborate tabular matter and careful working drawings—is to realize the extraordinary development of the cyanide process since 1887. In that year Messrs. Wanliss

and Julian, acting as consulting engineers to the Johannesburg Pioneer Company, erected the first small plant in which the cyanide solution was used as an adjunct to amalgamation. Since that time the chemist in his laboratory and the metallurgist at the mines have been strenuously working hand-in-hand to perfect every detail of the process, and throughout they have, it must be remembered, been forced to work under the ever-present limitations imposed by pecuniary considerations.

To continue the process of dissolution until all of the gold is captured is necessarily to reduce the output; to remove entirely the impurities present in the solvent—though to do so would, of course, add to its efficiency—must increase the cost, though by ever so little. These are but instances of the advantages and disadvantages which have incessantly to be balanced in practice. What is theoretically the more perfect way of procedure must always give way to the interests of the investor. To get as much gold as it will pay to get is the only rule. But though this be so, it is very satisfactory to note the tone in which the more modern writers, such as Messrs. Julian and Smart, treat such subjects as these. . . .

. . . In this volume, every slight change in the details of practice has been noted from all parts of the world and is carefully examined and described. But the scientific reasons for each change are duly set forth, even though this necessitates the discussion of topics so difficult and often so recent as the newer views of solution and electro-chemical phenomena—discussions which few gold-seekers of the older kind would have listened to with patience. . . .

In its combination of sound theory clearly understood and clearly stated with wide practical knowledge, we have met with nothing more helpful in its way than this thoroughly up-to-date and business-like treatise.

Mr. Sulman, a past president of the Institution of Mining and Metallurgy, in a letter to the present writer in 1912, refers thus to Forbes Julian's labours:

"I profited greatly by his work. His volume on 'Cyaniding' has for many years been recognized as the best treatise on Rand practice, and of the greatest

possible value to technical men. To ourselves it has been invaluable."

Generous testimony to the value of his work was received from several other metallurgists, and warm congratulations immediately poured in from colleagues and associates. Their letters show the favourable opinion formed of his scientific labours by eminent experts.

A letter in the *Times*, written after the news of Forbes Julian's death had been received (April 20th, 1912), says :

"He will be remembered as the joint author of 'Cyaniding Gold and Silver Ores,' which as a text-book has been widely consulted."

A scientific man builds not only for his own generation but for those which follow him, and by his researches Forbes Julian helped to develop the process which has worked such a change in the recovery of gold and silver from ores. His contributions not only threw much light on the subject, but opened up a fresh line of investigation, and gave him a permanent place in the history of cyanidation, and the text-book published about a decade ago still holds the field.

A letter from Germany received in April 1904 from his old friend Herr Friedrich Stockhausen brought the sad intelligence of the death of their colleague Herr Hugo Andreae, with whom they had both worked long and earnestly at metallurgical problems in South Africa ; and it also conveyed the thanks of the directors of the Frankfort Gold und Silber Scheide-anstalt for his book.

The loss of this friend was a very severe blow to Forbes Julian. He was the more affected by the intelligence as it recalled the pleasant days both in the Transvaal and Germany passed with a kindred spirit

and fellow-worker, with whom his life and scientific researches had been at that time interwoven and bound up. Their close friendship had in spite of absence and separation lasted until death. Herr Friedrich Stockhausen wrote :

FRANKFORT,
18*th April*, 1904.

It gives me great pleasure to thank you in the name of the directors for the copy of your interesting book "Cyaniding Gold and Silver Ores," which we received some time ago addressed to our Mr. Andreae. This gentleman was absent on business at that time and returned only a few days ago, apparently in good health, showing no visible sign that his successful career would be finished so soon. On last Thursday morning Hugo Andreae was found dead in his bed, the physician ascribing the sudden end to apoplexy of the brain. I am sure you will mourn with me for the friend with whom we worked together in bygone days in the Transvaal.

In addition to his literary work Forbes Julian was also engaged on investigations at the little laboratory in his own house. Notwithstanding that he had recently been laid aside by illness and thus prevented from pursuing his studies in such a progressive subject as cyanidation, he had never drifted away from his technical interests, and the fact that he was able to overcome this difficulty so that he remained an authority in his own branch of science and made up for lost time is evidence not only of good natural powers but of a resolute will.

But however highly his technical work was appreciated by his colleagues, it was not this alone which secured for him the popularity he undoubtedly possessed. In the course of years he had made many friends who were not in a position to have been impressed by the value of his original investigations. To his charm in private life may chiefly be attributed the influence which he exerted. His modesty and

kindness of heart endeared him to many of those with whom he came in contact, and it was because of this unselfish disposition in daily life, more than from the patient and laborious labours of a hard scientific career, that he received so warm a welcome in different parts of the world. The mark he made on his generation sprang from his personality, and was shown not so much by his book or his researches, valuable as these were, as by his influence over his colleagues and other men.

CHAPTER VIII

HOME LIFE AT TORQUAY AND TRAVELS IN ENGLAND

NO truly adequate impression of a man's character and worth can be based upon the external manifestations of his public life and his professional relations. It is in the relaxation of home life that these are best revealed and serve to picture what such a man really is. The following intimate account of the home life lived by Forbes Julian at Torquay will therefore help towards a better appreciation of the real man than a too insistent account of his professional pursuits and avocations.

Despite the many demands on his time and attention he found frequent opportunities for much pleasant intercourse with friends and neighbours. Amongst the many visitors to "Redholme" were Miss Alice Zimmern, the authoress of "Tales from Old Greece," and Mrs. Buckley Fisher, the authoress of that popular work "The Fairyland of Science"; while in the spring of 1903 Professor and Mrs. Barker, of Philadelphia, stayed at Torquay, Forbes Julian himself deriving the greatest enjoyment in discussing physics and chemistry with the professor, whose conversation he found most interesting and stimulating.

In March of the same year Bishop Ryle, who had been transferred from the see of Exeter to that of Winchester, visited Torquay to deliver an address at the Pengelly Memorial Hall, and was a guest at "Redholme." That he quitted the west of England

with great regret is shown by an extract from his letter, sent from the Palace, Exeter, just before leaving, in which he says :

> I shall bitterly grieve over my severance from Devon. But the kindness of my friends gives me cause for thankfulness and consolation.

In his address at Torquay Bishop Ryle dwelt especially on the power of the Resurrection and the necessity of a constant realization of this great central truth of Christianity. The devotional spirit in which he spoke made itself felt by all present and riveted the attention of his hearers, as he expressed in simple but eloquent words the full and fearless teaching of "the faith once delivered to the saints."

During the summer the Julians travelled up to London, attending a number of scientific lectures and conferences, and the Royal Society's conversazione. Lighter recreation was afforded by several attendances at Shakespearean performances at His Majesty's Theatre, but Forbes Julian was never an enthusiastic theatre-goer, although as a Shakespearean student he derived much pleasure from the performances in question. He also greatly appreciated the Opera, his natural love of music having been developed and cultivated during his stay in Italy and Germany.

Returning home in July, he and his wife were present at the Devonshire Association at Sidmouth, which was a most successful gathering. The valuable papers and reports given by the Rev. S. Baring Gould, Dr. Brushfield, and Mr. A. R. Hunt, being on subjects connected with the county, were attractive even to non-scientific hearers. Sir Edgar Vincent filled the presidential chair with ability, and his opening address was well illustrated. On the last evening a lecture open to the public is generally given, and on this occasion Dr. Johnston-Lavis, one of the members (lately

Professor of Volcanology in the Royal University of Naples), delivered an able lecture on "Vesuvius, the Type Volcano," which was illustrated with lantern slides made from photographs taken by Dr. Johnston-Lavis himself under conditions of no little difficulty and danger.

In September the Julians attended the meeting of the British Association, held that year at Southport, under the presidency of Sir Norman Lockyer. In the work of the Physical Science Section, where Professor Vernon Boys was chairman, and of the Chemical Section, under Professor Hartley, there was much that aroused the metallurgist's enthusiasm.

This meeting was the occasion of his first introduction to Sir William Crookes, Dr. Beilby, Dr. Divers, and other leading men, with whom he afterwards became better acquainted; and he appreciated the opportunities of intercourse that the gathering afforded with so many well-known scientists, and also hearing their discussions of the various problems over which he had long pondered.

During the stay at Southport he found time to visit the Westinghouse Works, and, moreover, to take his wife down a coal-mine near Wigan. The tour was further prolonged by a short visit to the Lake district and an expedition to the Isle of Man, undertaken in company with their American friends Professor and Mrs. C. H. White, of Georgia. The archæological remains, including the Runic and Celtic crosses and the ruined cathedral of St. Germans, with the Round Tower and Castle at Peel, were carefully inspected, being of exceptional interest. The mountain of Snae Fell was also visited and fine views obtained of the mountain ranges in England, Wales, Scotland, and Ireland, which can only occasionally be discerned in unusually clear weather.

Returning to Devonshire in the late autumn, a visit was paid to Mr. Brooking Rowe, the well-known archæologist, at Castle Barbican, near Plymouth, the Christmas season being spent at home at Torquay.

It was naturally a great pleasure to Forbes Julian to meet those who were well acquainted with South Africa, and when during 1903 Dr. Chandler, Bishop of Bloemfontein, stayed at Torquay much mutual enjoyment was derived from talking over many matters of Colonial interest, recalling quaint experiences of travel in bullock wagons and mail-carts, sojourns in out-of-the-way farms, and wanderings over the veld. Writing after his return to Bloemfontein, the Bishop refers to the havoc wrought by the disastrous floods which had recently occurred in the Orange River Colony, and describes a good deal of Bloemfontein as having " been washed away by the terrible flood," and its course as marked by " ruins of houses and masses of corrugated iron."

Other South African friends met with at Torquay were Sir Arthur Havelock and Mr. F. P. T. Struben. The former (a nephew of the heroic Sir Henry Havelock, of Mutiny fame) had been Governor of Natal, and to the latter and his brother, Mr. H. W. Struben, is ascribed by common consent the distinction of having discovered the Witwatersrand goldfields. It will readily be understood with what pleasure the metallurgist met one who had been so intimately associated with the early days of gold-mining on the Rand, and whose pursuits had been so much akin to his own. With the late Governor of Natal he had also many interests in common. Sir Arthur's letters were ever welcome, and in like manner his conversation always afforded pleasure. The strength of those ties which connected Forbes Julian with South Africa and all the old associations with his

early technical work there were still closely felt by him in his maturer years.

During March he and his wife entertained her father's old friend Sir Robert Ball, who was lecturing on astronomy at different towns in Devonshire. Dean Pigou also visited Torquay about the same time and was their guest at "Redholme." The two visitors seemed glad to meet and exchange stories and anecdotes, and both appeared to draw on a perfectly inexhaustible storehouse of narrative and varied information.

One such anecdote related to a compositor who set up a sermon that was being printed for a perfervid preacher, who was made to wind up a thrilling harvest sermon with this fierce threat: "Doubtless I shall come again with rejoicing, bringing my *shears* with me."

Another story related to a local magnate who, having been asked to thank some speakers for their addresses at a missionary meeting, uttered a few platitudes quite successfully. Being anxious to display some flights of rhetoric, he tried to wind up by speaking of the great pioneers of missionary work, and said, "I recall vividly at this time those never-to-be-forgotten names——" but stopped short, trying to remember who the immortals were. "I repeat," he said again, "that I now vividly recall those never-to-be-forgotten names." Being unable to remember even one of them, he suggested to the audience for the third time: "I have now to repeat to you that I recall vividly at the present time the never-to-be-forgotten names—of—of——"

"Never-to-be-remembered names" was in everyone's mind, but at this crisis some compassionate person handed a paper on to the platform containing the names of half a dozen of the most prominent

missionaries of the nineteenth century, and the unfortunate orator was able to bring his peroration to a close.

The account of an old Cornishman named Josiah, whose performances had been related to the present writer by her father, amused the visitors. It was as follows :

Josiah had lived an utterly reckless and boisterous life, and thus had earned the reputation of being a very bad old man ; but at length he turned over a new leaf, took to himself his fourth wife (a young creature, who brought him a new family), and lived as decently as the times demanded from a man of his accumulated years of bad habits. In order to show the decided character of his reformation he gave the firstborn son of his new family the name of Abraham. When the second arrived he was named Isaac. Of course there was no doubt as to the law of the father's intentions at the time—the third son was destined to be called Jacob. But, alas for human intentions ! no third son was born to him. Most men under the circumstances would have succumbed, and said, " You see, my friends, what I meant to do, and will of course applaud me ; but you must take the will for the deed, as fate is against me." That, however, was not the mould in which Josiah was cast. He snapped his fingers at fate, being resolved to complete the patriarchal trio and have a Jacob in his family. He accordingly bought a donkey and called him Jacob ; and it is pleasant to record that Jacob performed his duties admirably and outlived both his seniors in nomenclature.

Another Cornish story concerned an old man named Searle, who was a heavy, lumpish fisherman, ordinarily far too lazy to do any kind of work with the exception of fishing. Most of his fellows had a plot of garden

which they cultivated at the odd moments which present themselves in the life of a fisherman, or they did at least a little smuggling in order to "earn an honest penny," as they termed it, and bring up a family comfortably. Searle abstained on principle from exerting himself, the principle being that known in Scotland and elsewhere under the expression of "I canna be fashed." Now and then, however, he would throw off a little of his sluggishness, not to work, but to have a pot or two of beer, the effect of which was to loosen everything about him. His tongue manifested its freedom by informing the world, with an emphasis worthy an original remark, that "'twas a sad heart that never rejoiced." His liberated legs invariably broke out into a dance, which, though never graceful, was always energetic, as indeed might be expected when so large an amount of suppressed action had to be expressed. He commonly preferred footing it on the table, but, whether there or elsewhere, always danced in his stockings, making the prefatory remark that his wife "could mend stockings, but not shoes."

The history of one of Mr. Pengelly's early experiences in Torquay, when he was mistaken for a boon companion of the man he was trying to rescue, was also related. One evening about ten o'clock, when walking home, he had seen some large object lying in the road, and, approaching, found it to be a man fearfully intoxicated. On being raised to his feet the inebriate fell immediately, but after many efforts he succeeded in giving his name and address. Being familiar with the district, his rescuer resolved on taking him home. The labour was by no means trifling, as the distance was fully two miles, the night was dark, and the man was heavy and utterly helpless. At length his house was reached at about one o'clock in the morning.

A knock at the door was answered by his wife, with whom the following pleasant conversation took place: "Is this your husband?" "Yes, unfortunately. I wish he was in heaven!" "I found him lying in the road, and could do no less than take him home." "A pretty story to tell me! No doubt you've been drinking with him." "Good-night, ma'am. Here's my card." And in this way he disposed of his charge—and hers, for Mr. Pengelly's name was well known at the time to most of the inhabitants of Torquay as that of a prominent total abstainer.

Another story described a young fellow whom the geologist had taught gratuitously at a night school, the youth in question having apparently such insuperable difficulty in mastering the mysteries of the alphabet that it seemed likely he would never learn to read. The boy's father was, however, very anxious for him to be put into the writing class, and when met with the remark that "it was useless to teach anyone to write who could not read what he had written," replied, "You teach 'un to write, and I'll get somebody to read it safe enough."

With two Irishmen present, Hibernian stories were naturally abundant, being related both by Sir Robert Ball and his host. One concerned an Irish carman who had been ordered by a party of six people to meet them at a wayside station either with a wagonette or two outside cars. On alighting from the train and seeing only one small solitary vehicle, they asked him in astonishment if they could all be accommodated in the car. "Dade, and you can," replied Pat imperturbably. "It's like this, there's room for four if ye sit adjacent, and room for six if ye sit familiar."

There was good sense as well as humour in the remark of a countryman who thus answered his master's charge that he had come to work very late one morning:

" Sure I took the short cut, your honour, and 'twas that detained me." And the Irish maid-servant who was not an early riser, and so habitually late for Mass, was equally ready in repartee when she explained to those who taxed her with not being in time, " And it wasn't my fault, nor I that was late, but the praiste who wouldn't wait for me."

An Irish bull, which really described very clearly the characteristics of a domestic servant fond of roaming about, was expressed in the following remark made by the girl's employer.

" Where's Norah ? " asked the master of the house irritably one evening.

" She's gone out again," replied the mistress apologetically.

" Gone out again ! Confound that girl, she goes out twenty times for the once she comes in ! " exclaimed the long-suffering master, who wanted his supper.

Another story gave an instance of the blarney of the Irishwomen who come out to sell lace to travellers.

" Buy this Limerick lace for your wife, my pretty gentleman," said an old crone on one occasion.

" How do you know that I am married ? " was the reply.

" Not married ! Buy it for your lady friends then," she replied, nothing daunted.

" I have no lady friends," was the answer.

" No lady friends and you so good-looking ! " came the ready retort in a tone of affected incredulity as to the truth of this statement.

Sir Robert Ball's lecture at Torquay was appropriately delivered on St. Patrick's Day, and the extremely clear and luminous style of his address made the charming exposition of his favourite subject an

enjoyment even to those hearers who had no great knowledge of astronomical science.

Before he started for the lecture hall a local photographer who had discovered his presence came to the house and, after some difficulty, persuaded the astronomer to be photographed. He only consented on condition that his fellow-guests, Dean Pigou and the Honourable Helen Cubitt, with his host and hostess and her sister, should be photographed in a group with him. This was accordingly taken in the garden at " Redholme."

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Photo by Dinham, Torquay

HENRY FORBES JULIAN — DEAN PIGOU — SIR ROBERT BALL — HESTER JULIAN

MRS. MAXWELL — HON. HELEN CUBITT

CHAPTER IX

SCIENTIFIC PAPERS AND MEETINGS. VISIT OF CAPTAIN SCOTT

PART of the summer was spent in London, and after attending the meeting of the Devonshire Association at Teignmouth Forbes Julian and his wife returned home at the end of July. He was now beginning to take a prominent and useful part in the proceedings of the Torquay Natural History Society, and gave a paper before the members on "Electrolysis" at an evening meeting early in August. In reading, his voice was low-toned and pleasant, with a slight touch of hesitation. Much interest was manifested in this communication, not only by residents in the neighbourhood, but also by his friends at a distance, particularly Professor Barker, and Mr. Charles Neild of Manchester, the latter coming down from Lancashire to hear the paper and the discussion thereon. After delivering this discourse he started with his wife for Cambridge, where the British Association assembled this month. The Prime Minister, Mr. Balfour, was President in 1904, and contributed to the value of the gathering by his thoughtful address and able chairmanship. The proceedings were of a high order of merit in Sections A and B, Professor Horace Lamb taking the chair in the section of Physical Science and Professor Sydney Young in that of Chemistry—the papers contributed by Sir William Ramsay, Sir James Dewar, and Dr. Beilby at the latter section being especially noteworthy

to Forbes Julian, who rejoiced in every onward step made by science.

A day was spent at Ely in seeing the magnificent Minster, that "most stately and varied cathedral-church of the Fens," under the guidance of Dean Stubbs, and afterwards visiting Archdeacon Emery, the founder of the Church Congress. Many receptions were held during the week and tours of inspection made to the colleges, visits also being paid to Sir Robert and Lady Ball at the Observatory and to other friends amongst the professorial staff of the University.

Early in the winter the Rev. Dr. Plummer, of Durham, gave some addresses on Church History at the Pengelly Memorial Hall, and Colonel Sir Thomas Holdich, of Afghan fame, lectured on Tibet at Torquay. They both came to "Redholme," where several friends interested in historical matters and in geographical research had been invited to meet them.

Soon after this visit Sir Thomas wrote from South Kensington on December 14th:

> . . . I have been away on a lecturing tour in Scotland, and find on my return considerable arrears of correspondence. . . . I shall always remember my pleasant visit to Torquay, and the time which I spent with you. . . . I envy you the capacity for keeping in touch with those whose scientific work in the world is so interesting. I am sending you a work on India, a geographical text-book which I wrote five years ago; the Clarendon Press published it, and you may find something of interest to you in it. . . .

In December a Christmas party was given for Captain Robert F. Scott, who delivered an account at Torquay of his Antarctic travels, and in whose adventures all his fellow Devonians felt especial interest and pride. His lecture there, and at other places, was remarkably successful, and appealed not only to lovers of geographical discovery but to the general

public. The fact that the gallant sailor had penetrated four hundred miles further south than any previous adventurer, and so much nearer the South Pole, sent a thrill of excitement through the British people and gave a new impulse to their desire for a fresh expedition, in the hope that the desired goal might be ultimately reached.

Many years had elapsed since the previous South Polar expedition, which was so bravely undertaken by Sir James Ross and his companions. Their graphic accounts of the awful perpendicular cliffs of ice encountered had left a keen impression on the minds of those interested in geographical exploration of the dangers and difficulties to be met with in the Antarctic, so that Captain Scott and his party naturally received an enthusiastic welcome from the whole country for their intrepid heroism. At Torquay the thought of his magnificent exploit and the modesty with which he related his wonderful narrative held the attention of the whole audience spell-bound, as he described in simple language the story of the hardships that the members of the expedition had suffered, and the cheerful manner in which their privations had been borne. His was a feat worthy to rank high amongst the greatest geographical exploits—an enterprise that has advanced the credit of Devon and shown that her sons are worthy successors of Drake, Raleigh, and Hawkins in bringing distinction on the British flag, and that they are animated by the spirit of those great Devonians—to whom England owes her prosperity, her religious freedom and records of heroism—who defeated the Spanish Armada and helped to lay the foundations of our Empire. Driving back from the lecture, further details were given, and from Dublin, whither he proceeded (to give a lecture on his Antarctic experiences), Captain Scott wrote

expressing the pleasure that the visit to "Redholme" had afforded him.

He also lectured at Cheltenham and other towns during December, and special interest for Forbes Julian and his wife was afforded to the description of the exploit on account of the presence of Dr. Wilson on the expedition, whose sketches exhibited in London had given them much pleasure. The doctor was related to the present writer's cousin, who on December 5th wrote from Worcestershire, alluding thus to the officers on the *Discovery :*

. . . We are hoping to hear Captain Scott's lecture next Saturday at Cheltenham ; I have written to my cousin, Dr. Wilson, to get us tickets. His son, Dr. E. A. Wilson, was one of the medical officers on the *Discovery* and one of the three men who undertook the sledge expedition far away south. We were at Mill Hill for a few days about the middle of last month, and one afternoon we went to see the Antarctic Expedition Exhibition in Bruton Street ; it was most interesting and my cousin's sketches were lovely, such wonderful colouring and so cleverly done. . . .

These pictures helped all who saw them to realize the extraordinary fascination of the Polar region, its vast desolation, its mystery, beauty, and terror, with the weird snow and ice formations, strange clouds, and marvellous effects of light. In their second expedition Captain Scott, Dr. Wilson, and their brave companions clung to their project with British tenacity until the South Pole was reached. They and their companions, in fame and in death, have shed the light of their own heroism on the path of future explorers. Sir Arthur Havelock took much interest in the visit of Captain Scott, and wrote on December 6th from Kilmorie, Torquay :

It is very good of you to ask us to meet Captain Scott. . . My wife is writing also to say how very much we hope you

will both be able to give us the pleasure of lunching with us next Monday, when, if you will allow me, I will show you my collection of curiosities picked up in various parts of the world. . . . Will you accept a copy of the December number of *Longman's Magazine*, containing a paper on Japan by my brother-in-law, Mr. W. E. Norris ? . . .

It was at Lady Havelock's parties that they had first met Mr. W. E. Norris, the well-known novelist who writes so agreeably about modern society, his characters being exceedingly well represented and wonderfully lifelike.

Other literary residents in Torquay at this time were Mr. Eden Phillpotts, the gifted exponent of Dartmoor; Miss Christabel Coleridge (a granddaughter of the poet Samuel Taylor Coleridge), the writer of "Lady Betty" and several other stories; and Miss Mary Findlater, authoress of "The Rose of Joy," with her sister Miss Jane Helen Findlater, the writer of "The Green Graves of Balgowrie."

It was always a pleasure to converse with them on literary topics, and some of the works of the modern school of Polish novelists, which were greatly attracting Forbes Julian, were new to Miss Findlater and her sister. Miss Jane Helen Findlater wrote in November 1904 from Mount Stuart, Torquay:

. . . I hope to return your books soon, but as you said there was no great hurry about them, I am taking time to enjoy "The Children of the Soil," by Henryk Sienkiewicz, as it deserves; it is a wonderful book and seems to transport one into a new world. . . .

In addition to scientific matters, the metallurgist was an enthusiastic and diligent reader of poetry and of contemporary European fiction. He had studied the great German and Italian writers whilst at Frankfort and Florence, and was well acquainted with the writings of Balzac and many of the celebrated novelists

of France. For the Russian authors Tolstoi and Tourgueniéff, with their imaginative power and philosophic insight, he had the highest admiration. He also enjoyed the works of several of the writers of Holland and Hungary, especially Maartens and Maurus Jókai.

A favourite English work was "The Private Papers of Henry Ryecroft," that beautiful book that has found its way to the hearts of so many Devonians. Of all British novelists Thackeray was the most highly appreciated and most frequently read. The kindly wit and genial humour which give such an indescribable charm to the simple occupations and incidents of daily life as described in the works of Jane Austen and Mrs. Gaskell also afforded him unfailing pleasure.

This winter some motoring expeditions taken with friends on Dartmoor in cool but brilliantly bright weather were much enjoyed. This wild tract of uncultivated country, with the rugged granite tors, rushing torrents, and beautiful hills and glens clothed with fern and furze, at all seasons exercised a great fascination over Forbes Julian, who delighted in the wildness and grandeur of moorland scenery.

In January 1905 Professor and Mrs. Ayrton were at Torquay, when he had the pleasure of meeting this distinguished scientist and his accomplished wife. The Professor was looking forward to the approaching gathering of the British Association in South Africa, having promised to deliver a lecture at Johannesburg, and as the metallurgist was contributing a paper to the Chemical Section, they had some discussion on the subjects which mutually attracted them. The Professor also examined the little laboratory apparatus at "Redholme," and heard of the progress of his host's researches, with accounts of his labours, during the past two years of quiet work at home.

Visitors at Torquay during the winter included Sir Bernhard Samuelson and Sir John Hibbert, both these retired Members of Parliament taking a warm interest in those practical problems of modern life that concern men rather than wealth, and which had always appealed strongly to Forbes Julian—questions for which succeeding generations are likely to demand a still more prominent place. Others interested also in these important social matters who frequently visited Torquay were Lord Ashcombe and Mr. Albert Pell, whom he met about the same time.

He felt that it was necessary to inculcate a real sense of individual responsibility, teaching men to raise their ideals and expand their outlook, and to discountenance that anxiety for rapid results and hasty legislative makeshifts which constitutes a real menace to a modern electorate. His feeling was of the kind which would strive to bring home to the hearts of others a sense of the sacredness of national life; the greatness and continuity of Britain's history, her traditions of disciplined freedom and her increasing colonial obligations in all parts of the world; to further a knowledge of the far-reaching responsibilities, as well as the advantages of good citizenship and loyal imperialism; so that the vast empire may be built up on the social virtues of self-reliance, discipline, and mutual trust. This had become his ideal during the long and extensive travels of former years.

With the advent of spring other visitors arrived, and in March Lady Binns (the widow of the late Premier of Natal) came to Torquay and visited "Redholme," meeting Sir Arthur and Lady Havelock there, and talking over bygone days in South Africa and many subjects of imperial interest with them and her host, who, having lived in the colonial world, shared in and understood its aspirations.

After attending the annual general meeting of the Torquay Natural History Society (which he was still serving as a member of committee), he and his wife went to London, breaking the journey in Dorsetshire for the purpose of witnessing the Sherborne Pageant. This picturesque and novel event of the early summer was the first of a series of folk-plays and historical representations that have since become increasingly popular. Whilst in Town he was occupied with the various scientific engagements which were always so congenial. The Thursday afternoon meetings of the Royal Society and the annual soirée were attended at Burlington House through the invitation of the President, Sir William Huggins—Dr. Wilson, of the Antarctic Expedition, being present at the latter gathering and giving a short address.

During this visit to London preparations were made for an approaching voyage to South Africa, undertaken with other members of the British Association. A good many years had passed since Forbes Julian had been there, and he looked forward to the expedition with enthusiasm. But as the programme of the meeting was long and interesting, forming an important epoch in the yearly annals of the Association, the description of this journey must be told in the next chapter, with some account of the Paper which he read at Johannesburg before the members of the Chemical Section.

CHAPTER X

WITH THE BRITISH ASSOCIATION IN SOUTH AFRICA

(Compiled from Mrs. Forbes Julian's Journals)

LEAVING Southampton in July by the *Durham Castle*, a comfortable steamer of the Union-Castle Line, Forbes Julian and his wife found themselves amongst a pleasant band of scientists and old friends. These included Professor Penck, of Vienna, and other foreign savants, and several British professors and their families.

After a few days at sea, Teneriffe was reached, and they were so anxious to secure the earliest glimpse of the Peak that they were up before dawn watching the gradual coming on of day and the steady development of the land. They were rewarded by seeing the beautiful sunrise, the snow-clad mountain, looking most glorious in a blaze of gold and crimson light, casting a brilliant reflection on all around. Soon afterwards a crowd of people came on board with articles for sale, and boats appeared full of boys who dived for the coins thrown them by the passengers. Unfortunately Captain Moseley, the commander of the *Durham Castle*, could allow only a short time for landing at the port of Santa Cruz, where the cathedral is the chief attraction. A longer time was, however, permitted at Las Palmas, the capital of Grand Canary, the only other stopping-place. Here a delightful drive was taken, the town being inspected and the

fruit market visited. It all presented a busy and animated scene. At the fine cathedral, which is of Spanish flamboyant style, the vestments and plate were shown to the visitors; and at the museum and other public buildings everything was done to enable them to see all that was feasible during their brief stay.

After leaving Las Palmas they were favoured with smooth seas and lovely skies, and the weather was extremely warm for a few days, but became comparatively cool again before the landing at Cape Town. On crossing the Equator the usual festivities took place, including the impersonation of Father Neptune.

The long voyage was a period of relaxation to all. Added to the pleasure of meeting old friends and making fresh acquaintances amongst those bound for the same destination, there were many novel features which marked the trip as exceptional, especially the delivery of evening lectures by Mr. Oscar Browning, Professor Reynolds Green, and Admiral Maclear. Discussions also were raised on various scientific topics in addition to the usual entertainments of a fancy dress ball, several concerts, a book tea, and games on deck such as are generally held on the South African liners. It was to be expected, with several naturalists on board, that those interested in marine zoology should enjoy seeing displays of the varied microscopic specimens collected from day to day, as the state of the sea changed and new forms appeared. This especially enlivened the monotony of the voyage; and the sea-birds that floated and wheeled around, and the flying-fish, porpoises, whales, and sharks also attracted attention.

Reaching Cape Town early in August, the travellers were greeted by Sir Colin and Lady Scott-Moncrieff,

Professor and Mrs. Cleland, and a few other members who had sailed on the *Kildonan Castle.*

The streets presented a great mixture of nationalities, Europeans, Asiatics, and Africans being seen, and every shade of complexion from pure white to yellow, brown, and black. The beautiful district round Table Mountain was eagerly explored, the first week in Cape Town being a period of pleasant excitement to those who had not previously been in South Africa. Once again, after the lapse of ten years, Forbes Julian found himself in Cape Colony, and it afforded him great enjoyment to revisit many familiar spots; he was able also to act as guide to his wife and various friends. The public buildings in Cape Town, including the Castle, the Parliament House, the Anglican and Roman Catholic cathedrals, the Mosque, the South African College, and other institutions, are worthy of attention, and were inspected with much interest. Service was attended at the Anglican cathedral, where Canon Crisp introduced himself to the visitors and conducted them over the beautiful Botanical Gardens, which, with the exotic and indigenous plants, form one of the most attractive places in the neighbourhood. On Tuesday, August 15th, the other members of the Association arrived on the R.M.S. *Saxon.* The inaugural meeting was held the same evening, when Professor George Darwin, the President, delivered the first part of his Address. The next day the business of the Sections commenced with the reading of Papers and the usual discussions; and Forbes Julian, now on the committee of Section B (Chemistry), was somewhat closely engaged.

On Wednesday afternoon Sir Walter Hely-Hutchinson, Governor of Cape Colony, received the members at Government House; and the Mayor (Mr. Liberman) held a conversazione in the evening at the City Hall.

On Thursday the reading of Papers was again resumed, and degrees were conferred by the University of the Cape of Good Hope on the President and many distinguished British and foreign professors. The members also drove out during the week in the charming Cape carts (vehicles on two wheels, covered with large hoods) to various places in the neighbourhood, obtaining beautiful views from Table Mountain and visiting the Kloof Road, Sea Point, and Camps Bay. At every turn new features claimed their wonder and admiration, and they were delighted with the genial climate and the natural beauties of the district.

One afternoon they were entertained at Groote Schuur, a fascinating old Dutch mansion, formerly famous as the home of Cecil Rhodes, and at this time the official residence of Dr. Jameson, who was unfortunately suffering from illness and absent in England. It was naturally a disappointment to Forbes Julian to miss seeing this friend of former years. The pleasure-grounds of Groote Schuur are charmingly situated at Rondebosch on the slopes of Table Mountain, and the house is exceedingly quaint and picturesque. The mountain itself is very striking with the straight level top from which its name is derived. The lower slopes are clad with fir-trees, and fine views can be obtained of the bright blue waters of the bay, greatly enhancing the beauty of the scene. The mountains and adjacent hills rise in magnificent terraces from 3000 to 4000 feet in height.

On Thursday evening Professor Poulton, of Oxford, lectured on "W. J. Burchell's Discoveries in South Africa"; and on Friday night a lecture entitled "Some Surface Action of Fluids" was delivered by Professor Vernon Boys. On Saturday, the 19th, a motoring expedition was taken to Houts Bay. The

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GROOTE SCHUUR

Photos by Miss Black

VIEW FROM GROOTE SCHUUR

visitors especially enjoyed the drive round the fine scenery of Table Mountain, the harbour with its ships, the city with its busy streets, and the distant views forming a varied panorama.

The *Durham Castle* sailed for Durban that evening, the *Saxon* having sailed on Friday, and as several of the members were anxious to spend the Saturday in Cape Town, whilst others wished to proceed sooner by the *Saxon*, some changes had taken place in the list of travellers on the two steamships. Several fresh friends were found on board the *Durham Castle*, including the President, Professor Darwin, Admiral Sir William Wharton, and Sir David and Lady Gill.

Durban was reached on the morning of Tuesday, August 22nd. It had been comparatively cool at Cape Town, and the warmer climate here, with the sub-tropical character of the beautiful vegetation of Natal, was evidence of the great difference between the waters of the Indian Ocean and the colder Atlantic currents on the shores of Cape Town.

Both in Cape Colony and Natal great hospitality was shown by residents to the members. On the day of arrival at Durban a reception was given by Sir Benjamin Greenacre, and an excursion was arranged on the following day, when the Sugar Mill at Mount Edgecombe (the largest in Natal) was visited.

Durban is charmingly laid out, and there are fine Botanical Gardens here as at Cape Town, the trees and plants being even more beautiful and luxuriant. One of the chief attractions of the gardens is the Palm House, where many gigantic palms and dainty ferns are to be found. The fragrance and delicacy of the richly coloured flowers and shrubs and the gracefulness of the palms add inexpressibly to the charm of the scene in Berea and other environs of this beautiful

place, few towns having more romantic natural features than are presented by Durban and its surroundings. Before leaving the district the travellers had the pleasure of visiting their friend Lady Binns at Berea.

The important evening lectures given by Professor Herdman on "Marine Biology" and by Mr. Douglas Freshfield on "The Mountains of the Old World" were popular and well attended.

A novel experience was added to the journey whilst at Mount Edgecombe by the spectacle of a series of war-dances performed by several hundred natives, the stalwart Zulus making a striking picture in all the war decorations of warriors ready for a fray. Some of them carried shields and staves, although it was considered prudent to forbid assegais. At the commencement loudly gesticulating men emerged, but later they were arranged in lines and groups, with a few head-men in advance. From these ranks gigantic and half-naked Zulu warriors sprang forward with flashing eyes, shouting, bounding about, and slaying their enemies in imaginary pantomime, whilst their excited comrades shouted back in response. The women applauded by clapping their hands and uttering wild and piercing cries. It was a strange display of barbaric revelry, one that must be seen to be fully realized. The visitors were thus able to witness some scenes of native life, as well as to study the metamorphosis from the savage to the civilized being.

The following day at Henley a great Kaffir dance by a thousand natives was organized in the presence of the Governor. This further glimpse of primitive life was of exceptional interest. The dance consisted of the men advancing and retreating in line to the accompaniment of much monotonous singing and stamping. The Ain-funze danced first, and were

followed by the Amampumuza, and they in turn by the Inadi. This curious spectacle was followed by another striking event, the marriage of Mhola, the hereditary chief of the Inadi tribe, to a fine-looking young woman, who was said to be of much lower rank than his own. The ceremony was lengthy, but was watched with curiosity by the visitors, and has been described in various papers.

After leaving Durban the members were accommodated in the four special trains hospitably arranged for them. At Pietermaritzburg, the capital of Natal, they were received at a garden party given by Sir H. E. Macallum, the Governor ; and evening lectures were delivered by Colonel Bruce on " Sleeping Sickness " and Mr. Ferrar on the " Antarctic Regions." In this picturesque city, situated in a leafy hollow and commanded by hills on every side, the travellers enjoyed visiting the beautiful and well-timbered Alexandra Park and the bright and attractive Botanical Gardens.

The two cathedral churches, St. Peter's and St. Saviour's, were visited. The remains of Bishop Colenso, the great scholar, repose beside the altar in St. Peter's. There has been a revulsion of feeling in recent years with reference to the subjects on which he wrote, and many earnest Churchmen now hold views far in advance of those once deemed too free and outspoken. Colenso's daughters still live at Pietermaritzburg and are great supporters of a generous policy towards the natives.

After leaving this city the historic part of the journey commenced, the railway ride across the district of the Tugela being full of sad but inspiring memories of the heroic dead and of the courage of our troops. Colenso and Ladysmith were the two stopping-places from which the battlefields of Natal were studied.

The fatal field of Colenso is full of mournful associations, with soldiers' graves on every side—a magnetic spot by reason of its recollections of strenuous strife. To the Devonian travellers, Wagon Hill, near Ladysmith, was one of the most memorable spots visited, for here was made the magnificent charge of the Devons upon which, it has been truly said, the fate of the garrison, and perhaps of British rule in South Africa, hung for a time in the balance. The fight was hard and long, but at last our heroes swept the Boers "like chaff before the wind in unutterable confusion, and at length, after fifteen hours' continuous fighting, through mist and darkness, scorching heat and blinding hail and rain, foodless, parched, exhausted," they obtained that victory, the impulse of which reanimated the hopes of all the British people so anxiously watching the fortunes of the war. The difficulties of the task before Sir Redvers Buller and the dangers and responsibilities with which Sir George White and the heroes of Ladysmith were confronted can be better understood after a visit to the battlefields and a study of the campaign on the spot.

At Colenso and Ladysmith, owing to the limited hotel accommodation, the members slept on the four special trains, which began to assume quite a homelike character. The train journey between Colenso and Ladysmith is probably the most striking in South Africa on account of the associations of the war, and many of the kopjes and krantzes held by Briton and Boer during the investment may be viewed in the neighbourhood. The fastnesses of the Drakensberg range, containing some of the grandest and wildest scenery in South Africa, can easily be visited from Ladysmith. The three highest points are Giant's Castle and Mont-aux-Sources in Natal, and Cathkin Peak, just over the border, in Basutoland.

Several members interested in geology and botany or fond of mountain climbing here left the party to make longer excursions, but as Forbes Julian was already well acquainted with the fine scenery of the Tugela River and the Drakensberg range he was more anxious to visit the noteworthy scenes round Colenso and Ladysmith; so that on the Sunday he went to All Saints Church with its chancel and transepts in commemoration of the gallant dead. He also inspected Devons Post, Wagon Hill, and other places of enduring fame.

The military defensive positions as well as the battlefields are marked by obelisks, and contain records of unique interest, together with the monuments in the town and the Intombi cemeteries. It will be remembered that as an advanced military post Ladysmith occupied a position of remarkable strategical importance on account of its situation, which commanded three sections of the railway line. The heroic part the defenders took during the war, when the town was besieged for four months by the Boer forces and subjected to frequent and heavy bombardment, and their invincible courage and determination, will never be forgotten. Nothing more gallant is told in the annals of war.

Natal has great variety of scenery and several differing climates, in the warm low-lying valleys, breezy uplands, and lofty mountains respectively. The valley of the Tugela River contains numerous charming spots, and the fine hills, which branch out in lofty spurs, are broken here and there by perpendicular cliffs many hundreds of feet deep. The valleys are clothed with luxuriant verdure, whilst beautiful creepers climb among the rocks, hanging in festoons of crimson and yellow, thus forming an effective contrast to the dark green foliage of the tree-clad slopes.

It is a great change to travel from the coast, with the rich tropical vegetation, to the Drakensberg range, with the hills studded with rocky outcrops and the well-wooded river-banks below, and then to pass on to the bare and boundless expanse of the veld.

At Johannesburg, the next stopping-place, Forbes Julian and his wife had the pleasure of seeing his brother Charles. They had been concerned to hear on landing that the health of the latter had recently been very precarious; but he had since rallied, and his doctor took a more favourable view of his progress at this time. As he was unequal to going to the meetings, they were the guests of Mr. and Mrs. Lavenstein, but the two brothers met daily during the Association week.

On Monday, August 28th, an evening reception was attended at the Wanderers' Club, which afforded the travellers an opportunity of becoming acquainted with their generous entertainers. Received everywhere in South Africa with hearty hospitality, they were lavishly entertained throughout the week at Johannesburg.

On Tuesday, August 29th, the business of the Association recommenced with the reading of addresses and papers. At Section B (Chemistry), which assembled at the Transvaal Technical Institute, the proceedings opened with the masterly address of the President, Dr. Beilby. This was followed by a paper from Forbes Julian entitled "How Oxygen Assists and Retards the Dissolution of Gold in Cyanide Solutions." In the discussion which followed, the chairman (Dr. Beilby), Dr. Divers, Professor Henderson, and others took part. The paper aroused much attention in the mining circles of Johannesburg, where practical science is so greatly in evidence and so highly valued, metallurgy, chemistry, and engineering alike assisting to develop the mining industry.

In an account of the work of the Chemical Section of the British Association in South Africa, given in *Nature* for October 26th, 1905, it is stated:

> . . . A very active part in the work of the Section was taken by South African chemists, and almost without exception the reading of a paper was followed by an animated and interesting discussion. . . .
>
> . . . At Johannesburg the proceedings of the Section were inaugurated by the address of the President, which was of quite exceptional interest. It was followed by a paper by Mr. H. F. Julian, in which an investigation of the part played by oxygen in the dissolution of gold by cyanide solutions was described. The author arrived at the conclusion that free oxygen plays no primary part in the reaction, any assistance given being of a secondary nature, and that, as a matter of fact, it exerts a retarding influence. According to his experiments, while the balance indicates that free oxygen is of material assistance, the galvanometer points to its presence hindering the dissolution of the gold; the cause of the disagreement between the instruments he attributes to the formation of local voltaic circuits.

The paper was printed *in extenso* with other selected papers, which were published specially by the South African Association. An abstract of it also appeared in the British Association Report for 1905.

Numerous old friends welcomed him back to the city, which he was glad to revisit after an absence of so many years, being eager to note the changes that had taken place during the stirring events of the past decade. The energy, enterprise, and intelligence of the population of Johannesburg make it a most remarkable city to visit, the mental atmosphere being extremely stimulating.

Amongst those who took an active part in the meetings was Lord Selborne (Governor of the Transvaal and Orange River Colony), who welcomed the members of the Association to a garden party at Sunnyside on

the afternoon of the 29th. That evening Professor Ayrton gave a brilliant lecture at St. Mary's Hall on "The Distribution of Power." Wednesday, the 30th, was again spent in hearing papers and discussions, and in the evening Professor Darwin delivered the concluding part of his address, the first part having been given at Cape Town.

An expedition to Pretoria made on Thursday, August 31st, afforded many of the members an opportunity of seeing the famous Premier Diamond Mine; but as Forbes Julian was arranging to visit it later, he devoted the day to showing his wife various public buildings in the former Boer capital, the Museum and the Zoological Gardens, as well as the Government Departments, specially claiming their attention. The members were entertained at luncheon at the three principal hotels, and Sir Arthur Lawley, Lieutenant-Governor of the Transvaal, afterwards received them at Government House.

About a month later the second visit was made to Pretoria, and on that occasion there was sufficient time to see the city thoroughly and go over the Raadzaal, the Law Courts, President Kruger's house, and the church where he used to offer his devotions. At the cemetery the graves of many British soldiers were seen, including that of a grandson of Queen Victoria (a son of Princess Christian), all these resting-places of our brave warriors being tenderly cared for by the members of the Loyal Women's Guild.

The city is situated in a beautiful valley encircled by hills, the healthy climate and agreeable surroundings giving assurance of a prosperous future for the pleasant capital of the Transvaal.

On Friday, September 1st, an excursion for a few of the members was planned by special train to visit Vereeniging at the invitation of Messrs. Lewis and

Marks. The latter was a brother-in-law of their host, Mr. Lavenstein, and Mr. Marks kindly drove the present writer to visit the plantations, orchards, and farms of the Vereeniging Estate, whilst Forbes Julian went with others who were inspecting the collieries and brick and tile works. In the evening they joined the rest of the party on the British Association trains, and then proceeded to Bloemfontein.

The tiny town of Vereeniging is situated on the Vaal River at the point where the railway line enters the Transvaal. It derives its chief importance from having been the place where the Articles of Peace were agreed upon by Lord Kitchener and the Boer leaders. The Vereeniging Estate is situated partly in the Transvaal and partly in the Orange Free State. The district is noteworthy to geologists, for there is abundant evidence of glacial action in the conglomerate which forms the base of the coal beds. Striated boulders and erratics are plentiful, and root-markings are to be seen at right angles to the bedding planes. The fossil plant remains of this district are worthy of attention, and also the stone implements found on the banks of the Vaal River, which (through the kindness of Mr. Leslie) were shown to the visitors.

The next stay was in the Orange Free State, Sannah's Post and Tweespruit being visited, as well as Bloemfontein, the capital. Here Bishop Chandler welcomed them with much kindness; and a garden party was given at the Residency. The Raadzaal, National Museum, and other important institutions were also inspected. The cathedral is small, but appears to be well attended. As a rule Churchmanship is High in South Africa; the bishops and clergy are active workers, and have evidently been appointed not by favour but by merit.

The Orange Free State is essentially a pastoral

district, and seems progressing in a satisfactory manner. The colony consists of an immense tableland, with an area of 50,000 square miles. Although the river-banks are wooded, few trees are to be seen in the intervening country, with the exception of those surrounding the widely scattered farms. In the early part of the nineteenth century the land was covered with game, but now many species have unfortunately disappeared. Blesbok and the graceful springbok are still to be seen, but the few remaining herds of hartebeest and wildebeest have to be strictly preserved. Diamonds, gold, iron, copper, coal, and petroleum are found in varying amounts in different parts of the Colony, although the proximity of Kimberley and the Rand mines has hitherto tended to overshadow this mineral wealth.

A short time was spent at Kimberley, and the thoughts of the travellers naturally dwelt much on the heroism shown during the horrors of the protracted siege. The city was reached on September 5th. Here the diamond mines were inspected, and the fine specimens at the De Beers' office were shown to the visitors. A lecture given at the Town Hall in the evening by Sir William Crookes on "Diamonds" attracted a crowded audience, comprising scientists of various departments and a large sprinkling of the general public. As many people were unable to obtain admission, he repeated the discourse, with its clear statements and happy illustrations, on the following afternoon.

Several receptions were held at Kimberley, one being given by the Loyal Women's Guild. Much interest was taken both here and at Johannesburg in the Kaffir and Chinese compounds, which were found to be well built and maintained, the labourers being properly looked after in sickness or accident. Their food and water supply appeared very good, and Sir Lauder

Brunton, Dr. Wiseman, Dr. Gaskell, and other medical men (who were with the Association party) were impressed by the general excellence of the arrangements made for the comfort of the workers. The Chinese, however, were not free labourers, but were indentured for specific duties for a specific time. They appeared fairly honest, hard-working, and frugal, and although some outrages no doubt occurred, this was to be expected when so large a body of rough working-men were kept under severe restraint in a strange country. In England the Chinese question was so warmly debated and made so entirely into a political matter that the heated discussions which took place must be well remembered by everyone, and any further reference to the matter is unnecessary.

The tour of the British Association was concluded by visits made on the four special trains via Mafeking to Buluwayo and the Victoria Falls, which Forbes Julian had been amongst the first few white men to visit, as already described. It was stated that he was the only member of the Association who had previously been there.

The opening of the bridge over the Zambesi River by the President, Professor George Darwin, on September 12th, was a memorable occasion not only as marking the completion of a triumph of engineering skill, but also on account of its importance strategically.

Forbes Julian and his wife spent the rest of September with his brother Charles at Johannesburg. They also visited Mr. Edgar Smart on the East Rand, and Mr. and Mrs. Rintoul at Turffontein. As their hostess belonged to a Boer family, they had the opportunity of meeting her brother, Commandant Mostert, of General Cronje's staff, and the two Misses Joubert, who were also guests at Turffontein.

The consideration shown by General Joubert for

the British sick and wounded will always be gratefully remembered. His charming nieces spoke of the distress the opening of the war had caused him in the short time before his death, which came so speedily after the outbreak of hostilities as the result of severe labours and extreme anxiety. General Botha was another family friend of Mrs. Rintoul, and a fellow-traveller with Forbes Julian during a journey from Johannesburg to Pretoria.

Nothing could exceed the kindness of Mr. and Mrs. Rintoul or the hearty welcome of Mr. Edgar Smart, and it naturally afforded Forbes Julian great gratification to meet these old friends and discuss with his colleague the results of those investigations they both found so attractive and at which they had worked together so long and earnestly. When inviting the Julians Mr. Smart wrote: "I hope you will be able to stay for a few weeks, if you can stand a sort of location. A bachelor's *ménage* is, of course, somewhat lacking in many of the adjuncts of civilization; but I can guarantee you a chair each, a fire, table, carpet, and some pictures."

Before leaving the Transvaal an expedition was made to Krugersdorp, in October. The travellers saw the beautiful waterfalls in the neighbourhood, visiting also the Strubens' farm and the scene of the Jameson Raid, and making other excursions in the district, together with long drives on the veld. At Krugersdorp they inspected the Paardekaal Monument, which commemorates the defeat by the Boers of the celebrated Zulu chief Dingaan. The town is situated on the northern slopes of the Witwatersrand, and has a fine view of the lofty Magaliesberg mountain range. Time was also found for meetings with many old friends and for visiting several mines; so that Forbes Julian was enabled to gather much valuable informa-

tion as to recent work that had been undertaken, and to learn a great deal concerning researches and experiments that had been carried out in metallurgical and mining matters since his earlier visits.

The journey to the coast was made by way of Bloemfontein, Norval's Point, De Aar, and Matjesfontein. Passing at first through the rolling grassy plains of the Transvaal and Orange Free State, the scenery is somewhat monotonous; the bridge over the Orange River at Norval's Point marks the boundary between the Orange Free State and Cape Colony, and the district of the Great Karroo (a plateau of one thousand to two thousand feet in height) is exceedingly barren and desolate.

However, as soon as the railway route begins descending through the Hex River Pass the scenery becomes very beautiful. From the summit at Triangle (a height of more than three thousand feet), fine views are obtained of the valleys below, and the line can be seen circling for miles round the foot of the mountain. At Worcester, Wellington, and Paarl vine culture is carried on, the foliage and flowers also being rich and varied.

At Cape Town a pleasant visit was paid to Sir David Gill at the Observatory. The weather in the latter part of October was much warmer than it had been when they landed early in August; so they were thus enabled to enjoy the fine scenery of Table Mountain more fully than on the previous visit, as well as to see the varieties of heath and the beautiful lilies which grow as plentifully as weeds on the slopes of the mountain.

Sailing for England by the *Dunluce Castle*, they had nearly a month at sea. They decided to take the longer route home, wishing to spend a day at St. Helena, on account of its associations with Napoleon.

His residence at Longwood during the latter part of his life and his burial in the island invest this rock of the ocean with deep historic interest, although Napoleon's body now rests beneath the gilded dome of the Invalides. Other reminiscences were connected with one of the Boer commandants who had been a prisoner of war at St. Helena and whom the travellers had recently met in the Transvaal, when he had related to them many of his experiences.

The birthday of His Majesty King Edward, November 9th, occurring whilst they were at sea, some young English officers returning home on leave avowed their intention of " standing no nonsense " and making a German baron on board drink the King's health at dinner. Fearing that this proposition might be put in an ungracious manner, Forbes Julian, who was at the same table with the German, in addition to drinking his own Sovereign's health, bowed to the baron, and said, " I drink also to the health of the Emperor of Germany, and recall with much pleasure the kindness shown to me by his subjects in Germany." " And I drink the health of King Edward," said the baron in response ; but he added to the present writer : " As I think that my Emperor and your King are not very good friends at present, I should not have done so if your husband had not also proposed and honoured the toast to my Emperor." The incident therefore passed off happily, but the young officers were naturally somewhat disappointed at the collapse of their scheme for creating a piquant situation.

The steamer also stayed for a short time at Ascension, and this added to the variety of the voyage. Dr. Holbeach, the Bishop of St. Helena, was visiting this other island of his diocese, and was the only passenger who remained at this lonely outlying station of the Empire. His congenial companionship was

much missed on board. The steamer anchored at midday, and during the afternoon, after the dispatch of the mails, passed on her course to the Canary Islands. Here a day was spent before proceeding to England, and towards the end of the year the travellers landed at Southampton. The outward voyage to the Cape and Durban and the return voyage to England had been thoroughly enjoyed. The time spent in the Transvaal had augmented Forbes Julian's knowledge of that science which he loved so well, and enabled him to return with increased experience to his scientific and literary work; whilst the opportunity of revisiting scenes well remembered and of introducing his wife to his brother and to old mining friends, and showing her also many beautiful places in Cape Colony and Natal, had afforded him much pleasure. Throughout the tour he had been traversing ground already well known, and it was therefore doubly delightful to revisit these places again after the lapse of so many years, and to revisit them with his wife. The kindness shown by their colonial hosts and the friendships with men of science made on the steamers and special trains also added greatly to the agreeable recollections of an eventful journey, which included many memorable sights and scenes.

In a letter written immediately after landing he briefly describes the passage home:

We had a very pleasant voyage on the *Dunluce Castle*; it was slightly rough, about half a gale, for two days after leaving Cape Town, and it was again rough after leaving Las Palmas, but the remainder of the voyage was very smooth, the bay and channel being as placid as a lake. We had some hours' stay at St. Helena. . . . We arrived at Ascension at midday, sailing right round the island. It is a naval station, and occupied by about fifty bluejackets and a few officers. Passengers are only able to land by special permission. . . . We had a whole day at Las Palmas. . . . On arriving at

Southampton we were met with a fog, and since then it has done nothing but rain. We greatly miss the bright African sun.

In another letter to a friend, written about the same time, some allusion is made to the Association tour :

My wife and I have recently returned from South Africa, where we have been with the British Association. Altogether about four hundred members went from England, and were treated right royally by everyone. The party probably contained the largest number of eminent scientists who have left the British Isles together at any one time. The voyage was made exceptionally pleasant by intimate association with so many leaders in science. . . . Some of the papers read at Cape Town and Johannesburg were unusually interesting to me. It has been decided to publish several of them *in extenso*. . . . I read a paper on "How Oxygen Assists and Retards the Dissolution of Gold in Cyanide Solutions." Several important lectures were delivered; that by Professor Ayrton at Johannesburg on "The Distribution of Power" was eminently successful, and the lecture by Sir William Crookes on "Diamonds" at Kimberley was marvellous, every experiment going off without a hitch. . . . Johannesburg has grown out of all recognition, many of the buildings resembling those of an American city. There are far more Jews there now than formerly. I went over to the Premier Mine with David Rintoul, and I spent some time on the Rand, and also went down to the Old Rand Central Works. . . . The dust is as bad as ever and the climate as glorious.

Amongst other letters of welcome received on landing was the following from Professor Harley :

ATHENÆUM CLUB,
LONDON.

Many thanks for your kind letters from Cape Town and Johannesburg, with accounts of your travels and the generous treatment received. Everything turned out from first to last in a way that seems like a dream of romance. The

descriptions of the long journeys and impressions of Cape Town, Durban, Pretoria, Bloemfontein, Kimberley, &c., are most interesting, with the accounts of the extremes of temperature and the tremendous deserts of arid sand, barren and bare beyond all conception. What will become of their present magnificence when the gold and diamonds are worked out ? . . .

Sir David Gill, whose labours, kindness, and tact had been so instrumental in contributing to the successful character of the meeting, thus briefly alluded some time later to the good results of this South African expedition (Presidential Address to the British Association at Leicester, 1907) :

Having only recently come from the Cape, I wish to take this opportunity of saying that this Southern visit of the Association has, in my opinion, been productive of much good ; wider interest in science has been created amongst colonists, juster estimates of the country and its problems have been formed on the part of the visitors, and personal friendships and interchange of ideas between thinking men in South Africa and at home have arisen which cannot fail to have a beneficial influence on the social, political, and scientific relations between these colonies and the mother country.

CHAPTER XI

THE UNITED STATES REVISITED

THE return to Torquay in December was saddened by the intelligence of the death of Charles Julian, in whose health there had been apparently great improvement before his brother left South Africa, so that the news which reached England by cable came as a great grief, as past fond memories of their childhood crowded on his mind. The beginning of the year 1906 found Forbes Julian in London with his wife, and turning to the fresh work which lay before him, for his publishers, Messrs. Charles Griffin and Co., were anxious to bring out a second edition of the book on Cyaniding by Mr. Smart and himself. This necessitated much work in the metropolis, while the fresh facts obtained in South Africa enabled him to write with the authority of one who had seen for himself, not of one who merely quotes from others; and the recent time spent on the Rand with Mr. Smart helped to keep him and his fellow-worker in touch for successfully collaborating their undertaking. His life was cast at a period of great importance in metallurgy, and every year helped to broaden the base on which the science was being built up.

Amongst those whom he consulted as to fresh matters of interest in connection with the book were Mr. E. G. Banks, Mr. Hamilton, Mr. Merrill, and Mr. J. R. Williams.

On January 15th, 1906, he wrote to Mr. Merrill as follows:

I have recently returned from South Africa after a very interesting tour over the mining districts, where I have acquired some useful information in connection with cyaniding. The size of the plants has increased considerably since my former visit and the cost of treatment has been somewhat reduced. . . . There is now a great movement for fine crushing, owing to the fact that the cost of treating slimes has fallen below that of sands treatment, but there is much still to be done before the advantages of this change can be established beyond doubt. . . .

Before I left for Africa, some seven months ago, my publishers informed me that the first edition of "Cyaniding, &c.," was exhausted, and asked me to prepare a second edition. I have that now in hand, and am pushing on with it as fast as time will allow. I should be much pleased to hear from you such particulars of the important work you have been doing as you may wish to submit for publication under your name as the authority.

Writing to Mr. Hamilton during January 1906, he says:

My wife and I have been travelling with the British Association, and I spent a considerable time on the Rand observing the changes on the mines, particularly in connection with cyanide. Some of the plants are exceedingly large and substantially built, but there is not much new in the sands treatment. In the slimes treatment things have been developing until the costs have been reduced materially below that of the sands treatment. . . . I have managed to collect some valuable information for the second edition of our book, which is now in preparation. If you have recorded any fresh work . . . I shall be very pleased to hear of it as soon as convenient, or of any matters of interest in connection with cyaniding that have come under your notice. . . .

The engrossing character of the work may be gathered from one of his letters to Mr. Smart, to whom he wrote about this time:

I am at present plunged in the midst of revising the book, and from the enormous amount of new matter relating to

cyaniding that has appeared during the last two years, the revising and bringing up to date promises to be nearly as great a task as writing the original. We shall have to expunge a great deal of the book, and shorten the longer articles in order to keep the size down. The chapter on costs of working ought, I think, to be reduced to mere summaries, so as to use the space with more interesting data. . . . I shall be able to produce a short chapter on roasting. . . . I have already in the rough about forty thousand words which will require a good deal of boiling down.

In May an interesting evening was spent at the annual dinner of the Society of Authors, when excellent speeches were contributed by Lord Curzon, Mr. Bernard Shaw, and Mr. Anthony Hope, there being the additional pleasure of meeting a large circle of friends at the banquet.

June was passed at Torquay, and in July Forbes Julian returned to London, having accepted the post offered him by his old friend Mr. Charles Butters of consulting engineer to his company. With continued health and strength, his intellectual vigour was gradually turning back into the former channels, and as far as professional labours were concerned this responsible post was destined to be his work for the next six years, until the close of his life, since it was while going abroad in the service of the company, at the urgent request of Mr. Charles Butters, that he met his death on the *Titanic*.

Although associated with the firm on terms that should leave time for his own labours, he was now more tied to routine work and had to be frequently in London conducting technical matters for the company with his usual patient care. Fortunately, he had almost completed the revision and extra work entailed by the second edition of his book on Cyaniding, which appeared early in the following year, 1907.

Although the strong tide of life and work during

the winter kept him much in the metropolis, yet he frequently returned to Torquay, as he greatly preferred the country to being altogether in town; so that the engagements of London did not dispossess other interests at home.

In January Dr. Cosmo Lang, Bishop of Stepney (the present Archbishop of York), visited Torquay to plead for assistance for the hard-working toilers of the south and east end of London. Such visits had previously been paid by him in former years, and in this undertaking the Julians had long taken a keen interest, and had been to hear the Bishop's eloquent speeches and sermons in Torquay; they had also met him in town. The metallurgist's technical studies never absorbed all his energies, and he heartily sympathized in social work and gladly assisted whenever it lay in his power, for he was the last to rejoice in the happiness of his own home without thought of what lay beyond.

In the early part of the year 1907 the death occurred of his brother-in-law, Captain Louis Maxwell, the husband of his wife's elder sister. The two men had many interests in common and were friends in the true sense of the word, and this loss was a great sorrow to him. Major-General Patrick Maxwell, B.S.C., the Captain's father, had passed away at Bath only a few months previously.

Easter, which fell early this year, was spent at Torquay, but Forbes Julian and his wife returned to London for the remainder of the spring. Brief visits to Lady Burdon-Sanderson, at Oxford, and to Farnham Castle, on the occasion of a party given by Bishop and Mrs. Ryle, were paid during the summer, the beautiful grounds and the famous library and historic chapel at Farnham being inspected with much pleasure; and also the well-remembered colleges at Oxford.

Closely engaged in metallurgical inquiries and also

occupied with other professional matters in London during the rest of the season, the return to Devonshire was not made until the end of July, when the County Association, which assembled at Axminster, was attended, the President this year being Dr. Robertson, bishop of the diocese, whose scholarly address was followed with much interest.

The meeting of the British Association was held at Leicester early in August, when Sir David Gill was President, and threw much heartiness and brightness as well as wisdom into his happy chairmanship. Being now a member of the General Committee as well as of the committee of the Chemical Section, Forbes Julian was able to take some part in the work of the Association. A noteworthy feature at Leicester was a joint discussion between the Chemical and Engineering Sections on "Explosion Temperatures." Papers at the Physical Science Section given by Sir William Ramsay, Sir Oliver Lodge, and Professor Larmor also engaged his attention, for at many points physics and chemistry meet and blend, and the most conspicuous developments of the latter science during recent years have been on the physical side, and have produced most fruitful results. His mind was in many ways innovating and progressive, and he was always ready to entertain new ideas; but his conclusions were the reverse of hasty, and he was ever on the alert lest he should fall into error either in observation or inference.

Leaving Leicester for London immediately after the dispersion of the gathering, he wrote to his wife concerning the large amount of work that lay before him, saying: "I have been very closely occupied, and can see a great deal of work looming in the near future." Early in September he returned home for a short time, when some friends were invited to meet Lieutenant (now Sir) Ernest Shackleton, who was

residing in Devonshire before starting on his South Polar expedition. Many matters concerning the expected enterprise were discussed with the intrepid explorer who was leaving England to imperil his life in this endeavour to extend our geographical knowledge and plant the British flag in untrodden regions near the Pole.

Other visitors at Torquay this month were Canon and Mrs. Austin, from Jamaica. They gave graphic accounts of the havoc wrought by the earthquake there and the widespread distress occasioned in consequence. The Canon came to England to collect funds for the sufferers. The meeting held at the Pengelly Hall aroused much sympathy, the appeal leading to hearty and generous support. Many further details of the tragedy were also related during their short visit at "Redholme," twelve hundred persons having been killed at Kingston and many thousands injured in the wrecked and ruined city.

At this time Forbes Julian was looking forward to spending the autumn and winter in London and Torquay, but an unexpected cable from America altered all his plans. The message he received was from Mr. Charles Butters, inviting him to go to New York on professional matters connected with their "Patent Vacuum Filters."

The Butters filter is a highly specialized appliance for separating solutions of cyanide of gold from the finely divided and clayey "slimes" which are produced in considerable quantity during the crushing and cyanidation of gold ores. It is a development of the "leaf" form of filter, and in essentials consists of a series of hollow frames, the outer surfaces of which are formed of filter cloth, suitably supported, whilst their interior spaces are connected up to a vacuum main.

A number of these units are immersed in the slime-pulp and the vacuum applied. This sucks the gold-bearing solution through the filter cloths into the hollow interiors (and thus removes it for the subsequent recovery of its dissolved gold by precipitation), whilst the earthy slimes are retained in the form of a gradually accumulating cake upon the outer surfaces of the filter cloth.

When a sufficient cake-thickness has been attained and the residual gold solution therein has been washed out by water, the barren material is discharged from the filter-cloth surfaces by replacing the vacuum by a positive air-pressure. The clean filter is now ready to deal with another charge of gold-bearing pulp.

Simple as the device may appear from this outline description, its great practical success has only resulted from a long series of developments by the metallurgists of Mr. Charles Butters' staff, in connection with operators on other goldfields.

The details of the apparatus are many and complex, and have required years of painstaking work at the hands of skilled experimentalists.

The journey was hastily arranged, as it was only in the middle of September that Mr. Butters cabled from America to Forbes Julian begging him to come out to New York immediately. As his wife decided to accompany him, she left Torquay at once and joined him in London *en route* for Southampton, having only a couple of days in which to prepare for the voyage and for a sojourn abroad that lasted four months.

As none of the few letters written by Forbes Julian at this period have been preserved, the account of their tour has been compiled from the journals kept at the time by Hester Julian, which record notices of some of the institutions inspected in New York and

the acquaintances made, together with descriptions of visits to other American cities during the brief interludes of his scientific work. The account is given almost as written in the diary with only a few additions, and has therefore been left in the first person.

COMPILED FROM MRS. FORBES JULIAN'S JOURNALS

" My husband and I left Southampton in September 1907, and as the 'Fall' is the period when large numbers of Americans are returning from their tours in Europe, we discovered on getting on board our steamer, the *Saint Louis*, of the American Line, that we were the only European passengers in the saloon, all the others being apparently Americans, with the exception of a high-caste Hindu gentleman and his wife, with whom we often conversed, to the great disgust of our friend, Mr. ——, a Southerner, who more than once remonstrated politely but firmly on our 'demeaning' ourselves by talking to 'those coloured people.'

" We had a very comfortable cabin with a private bath-room attached, this being the state-room which Li Hung Chang had occupied during his memorable voyage on the *Saint Louis* some years before.

" My husband and I, being good sailors, were much on deck, and we soon made the acquaintance of several extremely pleasant American fellow-passengers.

" After having a stormy voyage, the weather became beautiful the day we landed, and we received a most favourable impression of the American coast, everything looking brilliant and being bathed in bright sunshine. Our American friends pointed out the Brooklyn Bridge (connecting Brooklyn with New York, the largest suspension bridge in the world), the statue of Liberty, the skyscrapers, and other prominent

objects which are especially striking when seen from the water.

"After landing and settling down at our hotel we had much to see, when the exigencies of professional work allowed my husband to accompany me.

"There are numerous noteworthy institutions and public buildings in New York which particularly attracted us. The Natural History Museum is full of interest, the collections being carefully and methodically arranged and catalogued; the geological collection, which we especially studied, being admirably grouped in a scientific manner that deserves the highest praise. The Museum of Art is another imposing building and possesses an extremely fine collection of beautiful pictures, the galleries devoted to sculpture, architecture, and antiquities being also of a high order of merit.

"At the Lenox Library there was a fine collection of early Bibles and other rare incunabula, and some valuable missals, including a copy of the Sarum Missal, and a large collection of autograph letters of exceptional interest.

"We visited all these institutions on several occasions, spending many hours at each; but saw very few people at the Natural History Museum, fewer still at the Museum of Art, and hardly any visitors at all at the Lenox Library, where the attentive custodian seemed so delighted by our enthusiasm for the exhibits under his charge that he begged us quite pathetically to visit New York again soon. All these places were open free to the public and centrally situated, so that the small attendance surprised us, for the collections might be expected to attract the casual passer-by as well as the serious student.

"Amongst other buildings inspected may be mentioned the Old and New Colleges, Barnard College,

the Normal College, and the fine library of the Columbia University. We visited several of the principal churches in New York, the older ones, St. Mark's and St. Paul's, being the more interesting. At the latter we were shown the pews of Washington and of the brave but unfortunate Major André. We also attended the Episcopalian cathedral of St. John the Divine, where the services were held in the crypt as the cathedral will not be completed for some time. Grace Church and the small church of the Transfiguration are both well worth visiting, and also the churches of the Heavenly Rest, of the Ascension and Incarnation, which are all handsome and well-built modern structures. Trinity, which is near Wall Street in the heart of the business of the city, has been rebuilt, but the churchyard contains several graves of early colonials.

"The funds for building the Roman Catholic cathedral dedicated to St. Patrick, in Fifth Avenue, were raised chiefly through the contributions of the Irish residing in New York, many of them only poor chambermaids and waiters at the various hotels. It is a beautiful edifice and does honour to their religious enthusiasm. The Baptists, Congregationalists, Presbyterians, Methodists, and other religious bodies have also numerous imposing places of worship; and at the Russian and Greek Orthodox churches we saw some good eikons. We went also to the chief synagogue. One afternoon my husband and I visited General Grant's tomb, which is situated on the beautiful Riverside Drive, overlooking the Hudson. I was interested in recalling the fact that the General had visited Torquay and that my parents had been invited to meet him.

"We landed just in time for the full glory of the autumn tints, which are so particularly rich and beautiful in North America, the splendid colouring of

the foliage in the closing year showing every shade from brightest crimson to mellow brown and golden orange. We much enjoyed the drives by the Hudson River and the walks in the Central Park and in Bronx Park, and at the latter visited the excellent Botanical Gardens. The conservatories contain plants from all parts of the world, the arrangement and classification being extremely good. The Zoological Gardens at the Bronx Park also aroused our enthusiasm.[1]

"We had never seen animals in confinement looking better cared for nor in more healthy conditions. The outdoor ranges for mammals, the reptile houses, and the vast flying-cages for birds are all wonderfully well arranged; and the surroundings are so charming that these gardens form a most attractive resort for the zoologist or the botanist. On other occasions we visited Prospect Park at Brooklyn, which is beautifully laid out, and Van Cortlandt Park with its fine woods and historic mansion built in 1748, used at one time by General Washington as his headquarters; this forms a pleasant excursion from the city, being only a few miles distant.

"Taken as a whole, New York is not attractive architecturally; the huge skyscrapers blot out the sunlight and air so essential to health and spirits, whilst the many narrow streets and the unsightly Elevated Railway detract from its general appearance. We were informed that the Singer Building of forty-five stories was the highest structure at that time, but buildings of even greater elevation have since been erected.

"The noise of the surface-cars rumbling up and down the streets and the passing of trains on the Elevated Railway add to the uproar and general dis-

[1] These gardens are referred to in greater detail in the letter of Forbes Julian given on p. 183.

comfort; while the bustling steamers on the ferries with their hooting sirens quite bewilder the European visitor on first landing.

"My husband, having retained a vivid recollection of the noise in New York on his previous visit there, had endeavoured to prepare me for it; but it must be experienced to be realized. London, even in such busy thoroughfares as the Marble Arch, Charing Cross, or the Bank, seems a quiet city in comparison, and the noise cannot be equalled in Paris, Berlin, Vienna, or any of the great European capitals.

"The surface-cars are generally full to overflowing, and on one occasion when getting out of this conveyance, crowded with 'strap-hangers,' I had great difficulty in passing some of the passengers, my place having been in the far corner. My husband, who was standing near the door (having given his seat to a lady), advanced to help me, and I was accidentally pushed against a man who was also alighting. Naturally I at once apologized, but he looked at me with surprise, for I had not yet learnt that to express regret was considered waste of time in the busy streets of New York, where little sympathy seems shown for fanciful notions of politeness. As no man in America is rude to a woman (at least, I have never met one who was), he turned on my husband instead, and as we reached the side path shouted out: 'Say, Britisher, I guess you're a man not much used to travelling.' I presume he thought he was letting us off too easily, so sent this remark after us, but as my husband at that time had considerably over a hundred thousand miles to his credit the parting shot fell harmlessly wide of the mark.

"The express lifts or 'elevators,' as they are called, in the different hotels and offices rush up past the first ten or fifteen floors without stopping; whilst a

slower lift, called the 'local elevator,' stops at each floor. They seem like express and local stopping trains.

" ' Don't take that elevator, you'll be all day getting to the tenth floor,' we were told on stepping into the slower one at our hotel when visiting friends on the tenth floor.

" Apparently everyone in New York is in a hurry, and the power of doing a thing quickly is greatly prized, without much attention as to the imperfections of the performance.

" Few people sit down to write letters—that would be considered too dilatory a proceeding; yet they will waste far more time than it takes to write several notes waiting in queues at crowded hotels like the Plaza or the Waldorf-Astoria to get 'on to the telephone' and communicate with their friends. There are telephones in all the hotel bedrooms, both for messages in the hotel and for long distances, and many people in New York (on account of the great difficulty in getting servants) live permanently in hotels, and can thus speak from their own rooms quite comfortably; but as they never seem to feel at home unless they are going out, they are frequently living at one hotel, lunching at a second, and dining at a third, so it often happens that they wish to telephone from their temporary abode.

" After looking at rooms in several hotels, including the Waldorf, the Belmont, the Murray Hill, the Majestic, the Plaza, and the Holland House, we were finally attracted by the Netherlands Hotel, which looks over the Central Park and is situated in Fifth Avenue, where neither surface-cars nor elevated railways are allowed, so that it is comparatively quiet. We stayed several weeks there. It is under the same management as the Waldorf-Astoria, is well appointed, and most comfortable in every way.

"From the first we met with great kindness, not only in New York but everywhere in the States, and no visitors coming from the Old World could have received a heartier or more cordial welcome, the memory of many pleasant hours spent with American friends being amongst the most agreeable recollections of a tour which embraced much that was of exceptional interest to us.

"As the autumn advanced we found the great heat in the public buildings and hotels rather exhausting, and English people are apt to take chills when the cold weather sets in, for the rooms there are often kept at a temperature varying from 70 to 75 degrees; and the contrast from this heated atmosphere when going outside and walking in the snow in winter frequently leads to serious results.

"The character of some of the busy traders is given in the words of an American, one of their most distinguished men of letters, Mr. William Dean Howells, who writes:

"They are purely commercial, and the thing that cannot be bought and sold has, logically, no place in their life. They applaud one another for their charities, which they measure by the amount given rather than by the love which goes with the giving. The widow's mite has little credit with them, but the rich man's million has an acclaim that reverberates through their newspapers long after the gift is made. It is only the poor in America who do charity—by giving help where it is needed; the Americans are mostly too busy, if they are at all prosperous, to give anything but money, and the more money they give the more charitable they esteem themselves. From time to time some man with twenty or thirty millions gives one of them away, usually to a public institution of some sort, where it will have no effect with the people, who are underpaid for their work or cannot get work, and then his deed is famed throughout the country as a thing really beyond praise.

"Yet anyone who thinks about it must know that he never

earned the millions he kept nor the million he gave, but somehow made them from the labours of others—that, with all the wealth left him, he cannot miss the fortune that he lavishes any more than if the check [cheque] which conveyed it were a withered leaf, and not in any wise so much as an ordinary working-man might feel the bestowal of a postage-stamp.

"We were sometimes amused by the references made to the price of things by a few of the less refined visitors at the various hotels.

"'That's my automobile. It cost fifteen thousand dollars' (£3000), was the remark of a lady, a total stranger, as she pointed out her motor-car to me from our hotel window; and when my husband joined me, she asked at once, 'Is that your husband?' On my replying in the affirmative, she said directly, 'Present me to him.' I answered that I should be happy to do so, but did not know her name. This little difficulty having been surmounted by the production of a bag with her visiting card, the introduction took place, when without further loss of time she pointed out the motor-car to him, remarking, 'My automobile; cost fifteen thousand dollars; it has all solid silver fittings.' She also gave us a list of her jewellery, and informed us of the price of several ornaments she was wearing at the time, and whenever we met her on several other occasions volunteered information about her diamonds and other precious stones, with a profusion of which she was always decorated. On our being anxious to escape the recital on one occasion, and my husband saying that he thought it was getting late, her daughter remarked, 'I guess I can tell you the time,' and we then noticed that she was wearing three watches. She kindly explained that 'she was terribly fond of watches,' and possessed seventy. At first this boasting amused us, but afterwards it made us long to emulate the behaviour of the deaf adder.

" Finding both these ladies very good-natured when we knew them better, we tried to interest them in the case of a poor and deserving woman whose husband was ill, and who was anxious to get work for herself, to support him and her children. We mentioned that the case was a genuine one, as we knew of it through an American friend, Mrs. Carroll, and a German friend, Countess von B—— (a cousin of Humboldt), who was engaged in philanthropic church settlement work in New York. We hoped we had persuaded the millionairess to employ our poor seamstress, but I unluckily added that when she worked for Mrs. Carroll or myself we paid her tram fares, as she lived in a remote and cheap part of the city. On hearing this, the poor possessor of all this wealth (for I think she was poor in all but her banking account) exclaimed, 'Is that so? I call that just extortion. She'll have no surface-car fares from me. Why no, I guess I won't employ her.' The fares in question amounted to ten cents, about 5*d.* of our money.

" Hearing that we were often out inspecting the museums and other public buildings, this lady feared it 'must be terribly dull going to such things,' and offered to drive us to see some of the stores in her celebrated automobile, and the more firmly we declined the more fervently were we pressed to accompany her on her shopping expeditions 'down town.' Her surprise at our rashness in refusing this tempting offer was only equalled by her astonishment at our obstinacy in adhering to our original decision, and she kindly allowed the idea to peep out that we were being greatly honoured by the invitation.

" Learning that my husband had been one of the founders of the Royal Automobile Club in London made her anxious to have his advice about motoring. Of their chauffeur these two ladies lived in considerable

awe. We often saw him strolling about the hotel in a free-and-easy manner during the day, listening to the orchestra in the evening or conversing with different guests. He easily persuaded them that it would injure the car to take it ' down town ' to Wall Street and other places where they usually went; so that they were forced to let him lounge about in the hotel whilst they took the Elevated Railway from the Sixth Avenue, on which there is only one class. Thus in spite of their great wealth they had to endure overcrowding and various discomforts with other people.

" ' Why don't you tell him that he must take you in the car ? ' asked my husband one evening when they were complaining to us of their unpleasant mode of transit.

" ' He's pretty sensitive, I guess, he might want to quit,' was the reply of the mother. ' Besides, he's real elegant, and gave me his arm and saw me into the Elevated Railway to-day. He's a lovely man ! '

" ' He won't wish to leave when he is so comfortable at your expense in this hotel,' said my husband. But she was evidently afraid to argue the matter with the man.

" We found, however, that for the following day she was determined to have the car, although they were only going to the Plaza, an hotel recently rebuilt, also overlooking Central Park, about one minute's walk from our hotel, The Netherlands.

" ' Oh, momma,' said her daughter, ' we don't need the automobile to go across there, we can walk right in.'

" ' I guess they won't think much of us if we do,' replied her parent.

" ' You want your friends to see the car, I suppose ? ' suggested my husband.

" ' No,' she replied frankly ; ' I was thinking of the waiters.'

" It was now my turn to be consulted.

" ' Shall we take our ladies' maid with us to the Plaza ? ' asked the daughter.

" ' Certainly not,' I replied.

" ' But she's asked to go, and she's mighty sensitive. I guess she'll quit, too, unless we take her. She wants to see the hotel, and would be terribly mortified not to come,' was the answer.

" ' I should think she would be very much in your way ; but, of course, you know your own affairs best,' was all that I could feebly suggest after this reply. And so the next day after lunch the whole party, the two ladies and their maid, escorted by the chauffeur, went in the motor-car in state to the Plaza.

" On their return the mother informed us that they had gone to the hotel for afternoon tea, chiefly in the hope of getting a glimpse of the Duchess of Marlborough, whom they believed to be staying there.

" ' I hope that you saw her Grace,' I replied, endeavouring to appear more interested than I felt.

" ' Why, it wasn't anybody called *Grace*, but the duchess herself whom we wanted to see. I guess it's not worth while staying on in this aristocratic location unless we meet some real aristocratic people, and I just hated leaving the Holland House, where there's always such delicious eating, and coming right away here,' she replied in a despondent tone

" This naïve consideration of the social advantages of the Plaza and Netherlands Hotels (adjoining Central Park) as contrasted with the Holland House, famous for its cuisine, but not in quite such an attractive situation, greatly amused us, and we soon perceived that after the task of acquiring wealth (the new ' Whole Duty of Man ' to some people in New York)

has been successfully accomplished, the pursuit of social success becomes an all-engrossing occupation.

"The short walk from the Fifth Avenue, with its Millionaires' Club and the many magnificent mansions of the wealthy, to the squalid wretchedness of Second or Third Avenue presents several peculiarly sharp contrasts. We visited some of the poorer parts of the city with Countess von B——, including the district where she was working. A well-known divine has ably described these social surroundings when he says:

"We recognize the horrible conditions of life in which great masses of the people live; we see how the quickening of the pulse of commerce and the economic life by steam and electricity has only intensified the powers that grind down and crush all who are near the bottom until, as men brutally said, there was only room left at the top. We see how labour-saving machinery rarely brings any shortening of hours, or increase in reward, to the labourer who works that machinery. We see how great Trusts dehumanize men's dealings with each other, and then there comes the expectation of a better day.

"In New York, Chicago, and other congested centres, where men make haste to grow rich, the prevailing conditions seem to have swept aside many of the old barriers that used to impede the activities of wealth and to have prepared a soil unusually favourable for the rapid growth of plutocracy with the many evils that follow it. The prevalent habit of attaching undue importance to material conditions is greatly to be deplored. By not a few people in these great cities poverty seems to be regarded as the worst of evils, and a purely materialistic standard of progress is thus created. Outward success has apparently brought in its wake great spiritual dearth through the extinction of many potent elements in the higher life.

"We were in New York during the commercial crisis

of 1907, which was keenly felt at the time and produced disastrous results. The excitement experienced and the suspicion and distrust then engendered in almost all classes will not readily be forgotten. No ready money, either dollars, notes, or gold, was forthcoming; nothing could be obtained but Clearing House cheques. Our Bank of England notes were received with the greatest satisfaction at the hotel, for many even of the extremely wealthy permanent visitors were unable to pay for some time.

"The week of the Horse Show in November, one of the great social events of the American year, added to our experiences in another way, and formed a pleasant relaxation in the midst of the technical work with which my husband was engaged. Even the harassed business men of the city, though apparently disliking a holiday, yet make a point of attending the Horse Show; and it gives the women unique opportunities of displaying their many charming costumes. One attractive young lady, a bride, who was at our hotel, informed me that she was ordering several fresh dresses for the Show, although she had only been married a few weeks and had not yet put on some of the new costumes in her trousseau. She became very friendly and we often had long conversations. 'I expect you will like soon to settle in a house of your own?' I suggested one day. 'Why no. I should be terribly mortified if my husband wanted to start housekeeping,' was the prompt and unexpected reply.

"The following incident will serve to illustrate the curiosity occasionally felt as to the clothing worn by others. A young Scotch friend told us that soon after she and her husband arrived in the States they had lost a near relative, and owing to this bereavement had gone to one of the large stores to choose mourning. Entering the bonnet department, she asked that some

headgear might be brought to her, and removed the black hat she was wearing. Immediately afterwards two other purchasers, who had been eyeing her intently all the time, picked up her hat, and one of them even tried the effect of it on her own head, turning to her companion and saying composedly, 'My, what a cute little black hat! How does it suit me?' Naturally this free-and-easy behaviour astonished our friend, as she knew that both women had seen her come in wearing the hat (which was by no means a new one), so that they must have known that it was private property and not exposed for sale.

"The children in New York seem particularly bright and friendly, but are without the pretty shyness which many of us find rather attractive in the younger generation of the Old World. They live as their parents' constant companions, and soon adopt their manner of speaking and thinking. Therefore it was not surprising, though perhaps rather pathetic, to find that the prices of things loomed largely in their young imaginations.

"One instance was told us by an American lady, who had been two years in Europe, and on her return went to see some wealthy friends whose little boy had been seriously unwell. Being taken to the child's room, she told him how concerned she had been to hear of his illness. 'Why, yes, I was terribly sick, and had two doctors. It cost a lot too, I can tell you,' answered the boy with portentous solemnity and satisfaction.

"A dear little child of six years old sat at the table near us at one hotel in the States, and had meals with his parents, beginning breakfast every day with iced water and grape-fruit, and taking a varied late dinner at half-past seven. He sat up afterwards till ten o'clock listening to the orchestra, and frequently gave

us the benefit of his experience of men and things, and proffered advice. He was very charming, in spite of being old before his time, keeping us amused with his baby wit and wisdom. It was rather disconcerting to find that his father was a medical man who suffered from severe indigestion himself, although the boy was allowed to feast on sweets and savouries as though dyspepsia was but a phantom of the imagination.

"My husband and I were frequently questioned about tours to be taken in Great Britain. A lady who had spent a few days in Scotland some years previously was amongst those anxious for further information. We found she had already visited Edinburgh and Glasgow. 'Probably you greatly preferred Edinburgh on account of its historic buildings and associations with the past?' we suggested. 'Why, no, I was terribly disappointed to find it such a mouldy old city. I like Glasgow better. It has more push and go and productiveness, and they had an elevator in the hotel there, but there was none at the hotel in Edinburgh, and I just hated walking upstairs,' was the reply. After this it seemed useless to give glowing descriptions of the antiquarian features of Iona, St. Andrews, and Stirling. However, many other acquaintances made in the States were familiar either by association or study with most of our historic cities and ruins, and eager to obtain suggestions respecting projected visits to places of archæological interest, showing no such disposition to magnify the present at the expense of the past.

"It would naturally be most unfair to suppose that the frivolity, ostentation, and continuous whirl of noisy life, without intervals for thought or natural simple intercourse, in which sojourners at a few fashionable hotels would be involved, justly represent what passes in the inner circles of refined American

social life. The givers of 'freak' entertainments also should not be considered as authorized exponents of taste and thought. Many interesting and cultured acquaintances were met with, and we could nowhere have experienced more kindness and courtesy or formed pleasanter friendships than in the United States.

"It is said that in New York strangers are sometimes asked how much they are worth; in Boston, what they know; and in the Southern States, to what family they belong. It certainly is a complete change from Chicago or New York to go down into Maryland or Virginia, where in many instances, except for the large coloured population, one might almost fancy oneself back in Great Britain. We were guests at a charming old house built when Maryland was a British colony by a Scotch ancestor of our hostess. He, being a Jacobite, had gone out there after the troubles following the rising in 1745–46, which ended so fatally for the Stuarts at the battle of Culloden.

"Our friends welcomed us with great kindness and hospitality, invited professors from the Johns Hopkins University in Baltimore to meet us, and took us to see the places of interest in their neighbourhood, including the University and Hospital, the Roman Catholic cathedral at Baltimore, and the Lexington market, which was an amusing scene and crowded with coloured people. There was an extensive fire in Baltimore a few years ago and much of the older part of the city was then destroyed, but several fine buildings have recently been erected. Our hostess and her son talked ably of scientific subjects, on art, literature, and politics, and tried to explain to us the differences between the Democratic and Republican parties in the States, always a bewildering topic to Europeans. They evidently had quite other ideals than the wealth and worldly prosperity so 'fiercely fought for and

greedily grasped at by the weary winners' in some of the great cities of the West.

"At Washington, the capital of the United States—'that city of magnificent distances,' as it has been so aptly called by the Abbé Carrea—we were kindly entertained by the British Ambassador and Mrs. Bryce later in the autumn. As their guests we had the opportunity of meeting several interesting people, and they desired to present us to President Roosevelt; but as he was away, and we could not prolong our stay, this was impossible. We, however, visited the President's residence, the celebrated White House, which is a simple building of Virginia freestone. General Washington himself had selected the site and laid the corner-stone in 1792, and he lived to see the building completed; but John Adams was its first occupant. Various alterations and additions were afterwards made. The surroundings also are noteworthy: in front is Lafayette Square, on the one side the Treasury, on the other the State, War, and Navy buildings. The White House is situated amongst fine trees and bright flower beds, and the grounds merge into the Mall and stretch away to the Washington National Monument, which is an obelisk of white marble, rising from an elevation near the Potomac River. We saw it looming against the sky long before reaching Washington, and in the city it confronted us in every view. It is said to be the loftiest work of masonry in the world, and is naturally regarded by Americans with considerable admiration. Of course the Capitol is the centre of attraction not only to politicians but to visitors generally, and we spent some time there examining the historical pictures and the statues of distinguished Americans in the charming Statuary Hall. We then went to the gallery of the Hall of Representatives of Congress, which is a very fine

Chamber. We hoped to hear the speeches, but there was so much loud conversation going on that we could gather nothing. Soon afterwards there was an adjournment, and we immediately proceeded to the gallery of the Senate Chamber, where we were rewarded by hearing a speech from one of the senators, who spoke most ably. The Library of Congress adjoins the Capitol. It is a beautiful building, the mural decorations being unusually fine; and it is said to be the best-lighted library in the world. Before leaving Washington we visited the Smithsonian Institution and the National Museum, which both stand in the same grounds. There is a good historical collection in the National Museum, and a valuable ethnological collection. There are also special exhibits illustrating the chief religions of the world. The natural history collections are intended to represent primarily the fauna of the United States, and secondly some of the principal forms found in foreign countries. The department of geology contains the extensive collection of the United States Geological Survey, all being admirably classified.

"Washington is adorned with many fine statues and avenues of stately trees, the parks and public gardens being charmingly laid out. It was only after long and heated discussion concerning the claims of New York, Philadelphia, Baltimore, and other cities to be chosen as the capital that Congress empowered the President, General Washington, to choose a situation for a city on the Potomac River. We were told that the site chosen by him, and which became the seat of the city named in his honour, was one to which he had been attracted when a young surveyor.

"My husband and I also visited the house in which Abraham Lincoln died. It is now converted into the Oldroyd-Lincoln Museum, and contains many valuable

autograph letters and publications, together with various objects connected with the murdered President, one of the most highly prized being the family Bible in which he wrote his name in boyhood. Other notable institutions in Washington which we saw during our stay were the Corcoran Gallery of Art, the Treasury, the Soldiers' Home, and the State Department.

"We also spent a short time in Virginia, but on a subsequent visit three years later we had more leisure to become better acquainted with this famous Southern State, and especially with Richmond, the former capital of the fallen Confederacy, and also with many historic places connected with the life and work of General Washington.

"Our next stay was at Philadelphia, and just as Virginia is full of associations with George Washington, so Pennsylvania recalls the names of William Penn and Benjamin Franklin—the first distinguished for his piety and zeal in promoting the welfare of all mankind, including the poor Indian; the second, one of the most remarkable men in science and literature that America has produced. It will be remembered that Philadelphia is situated on the Delaware River, and is the chief city of Pennsylvania and one of the most important places in the United States. It is called 'The City of Homes,' and we were most favourably impressed by the kindness of the citizens whom we met, everyone being friendly and endeavouring to give us information and assistance. There are many fine buildings, and the City Hall is crowned by the statue of William Penn, looking down over his own Quaker city. It is worthy of note that whilst Virginia and every other colony in the New World were visited in turn by the ravages and horrors of Indian warfare, no drop of Quaker blood was ever shed by a

red man in Pennsylvania. To William Penn was due this immunity from carnage enjoyed by his followers in the province he had founded, which had been granted to him by Charles II in payment for debts due to his father, Admiral Penn, by the Government. In his new country Penn's dealings with the Indians, like the rest of his methods, were humane, just, and in advance of his age; whilst religious enthusiasm and social theory went hand in hand under his guidance. He was willing to walk with the red men alone in their forests and to join them in their feasts. He caused Colonel Markham to inform them that he would not take by force a single rood of their ancient hunting-grounds, but would buy it from them with their full consent and goodwill; and that he would never allow his followers to annoy or defraud the Indians, to cheat them of their fish, their wild game, or their beaver skins. If a quarrel arose between a red man and a white man, twelve men—six Indians and six English—should be deputed to meet together and judge which was in the right, and settle the matter accordingly. It is pleasant to reflect that this was subsequently incorporated in the Great Treaty signed between the Six Nations and William Penn, and faithfully kept by the Indians.

"To Franklin's untiring enthusiasm the first library is due, and in 1743 he also founded the American Philosophical Society, which is the oldest organized body in America for the pursuit of philosophical investigation.

"The old State House, now known as Independence Hall, dates from early colonial times; and also the Pennsylvania Hospital and Christ Church, to which church our Queen Anne gave a set of plate for the Holy Communion that is said to be still used on certain occasions. Our pleasantest visit in Philadelphia was

to the old Friends' Meeting House, where a member of the Society of Friends received us most kindly, took us over the library, and gave us much information about the city. We also inspected the Roman Catholic cathedral, a large modern building, and went, moreover, to several of the public institutions.

"My husband and I spent Christmas week at Boston, and in this hospitable city we received a cordial welcome from some of its cultured inhabitants, finding much to enjoy and to remember with pleasure in this great centre of American intellectual life. It is charmingly situated at the head of Massachusetts Bay, near the confluence of the Charles and Mystic Rivers. From an early time the sea-girt peninsula seems to have attracted attention, as it was thought to present unrivalled facilities both for commerce and defence. It has substantial wharves on its water margins, many of them being covered with imposing warehouses. The public buildings and churches are numerous and well worth visiting. On Christmas Day we attended service at Trinity Church, where the musical service is beautifully rendered. It holds a considerable congregation, and is said to be one of the largest churches in the States. We found it crowded with worshippers. We also went to see some of the quaint old churches of early colonial days, and visited the Roman Catholic cathedral of the Holy Cross. At the chief Congregational church we read some of the pamphlets of the Mayflower League, we inspected the Unitarian church with its fine stained-glass windows, and saw also the curious church of the Christian Scientists, a large building of most peculiar construction. Benevolent and charitable societies flourish in the city, being heartily supported by its generous inhabitants. One of our drives was to Harvard and Cambridge, where we saw the homes of Longfellow,

Lowell, and others who had been undisputed rulers in the Republic of Letters. The University and Museum were also inspected, as well as the Bunker Hill Monument.

"Although it was winter, the weather was brilliantly bright and sunny, and this enabled us to judge how beautiful the Boston Common and public gardens must look in summer. We visited the Faneuil Hall, where so many political speeches were delivered in the revolutionary period. It was built in 1742, and the old State House was erected a few years later. The modern State Capitol on Beacon Hill is a very imposing structure. Several houses still stand which recall revolutionary days. There are numerous important buildings also in Copley Square, including the magnificent Public Library, which is said to be the largest free library in the world; and the Museum of Fine Arts, containing an excellent collection of paintings, sculpture, and antiquities. The Museum of Natural History with its large collections is situated in Boylston Street. However, it is impossible to give more than the merest passing reference to the various institutions that we enjoyed seeing in the city which Emerson described with patriotic pride 'as appointed in the destiny of nations to lead the civilization of North America.' It will be readily understood that the great libraries, art galleries, and museums offer many attractions to European visitors. We were interested also in the fact that a Boston friend who acted as our kind and courteous guide was descended from one of the signers of the Declaration of Independence.

"My husband, being descended from one of the Huguenot families who had been forced to leave France in order to secure the rights of conscience, was specially occupied at Boston in studying the memorials of the thoughtful and religious Puritan emigrants, who

are to this day revered as the patriarchs of America; whilst his sympathies and mine were also immediately engaged by recalling in Philadelphia the evidences of the deep spirituality of William Penn and the personal piety of his followers, for on my mother's side I am descended from a long line of Quaker ancestry.

"Other great centres were also visited, and on a northern tour into Canada we broke the long journey both at Albany and Buffalo, and saw the memorial erected to President McKinley in the latter city.

"My husband was anxious to take me to Niagara, and he enjoyed paying a second visit himself to the celebrated Falls which have been so long famous and constitute one of the chief attractions of the American continent. His previous stay had been in the summer season, and it was now midwinter; but he told me that he thought the snow-clad district, with the brilliant sunshine and rainbow-tinted spray, made the scene even more lovely than it had seemed to him before. The broken sheet of river, hurling itself down with incessant roar and whitening the precipice from bank to bank, presents a sight of unrivalled beauty, the neighbouring ground never ceasing to quiver with the roll and plunge of the precipitated water—the 'thunder water,' as the Indians poetically named it.

"We spent several days at Niagara, which was in every way advantageous, for it is only after making repeated visits and enjoying a constant view of the two cataracts, the 'Horseshoe' on the Canadian side and the American Fall on the southern side, that the marvellous grandeur of the scene with all its picturesque beauty can be fully realized.

"From Niagara we proceeded to Toronto, which is said to be the most English of all the Canadian cities. Here we received great kindness from everyone, and the weather (although cold and frosty, with deep snow

on the ground) was bright and beautiful, revealing to us something of the charm of the Canadian winter. We were delighted to be again under the British flag, and felt thoroughly at home; but unfortunately my husband's time was limited, so we could make only a short stay in the Dominion, and soon had to return to the United States. However, before leaving, visits were made to the University, the Parliament buildings, and the Law Courts, Toronto being a great educational and legal centre and the seat of the provincial government.

"The long journey had led us to several places with which my husband was familiar, as he already had visited them in his expedition to the North American continent in 1893. He saw that great changes had taken place during those fourteen years in the young and rapidly developing communities and busy cities of the Transatlantic West.

"In addition to his professional work he found much that was worth studying in various political and social matters, such as the question of the Trusts, then specially agitating men's minds in the States. His own views, though progressive, were never extravagant, and whilst recognizing the unwisdom of those whose whole aim in life seems to consist in attempting to stem the tide of popular feeling, he saw the danger of being deluded by the noise and clamour of ignorant demagogues. He was never a partizan, and this moderation won him many friends both in the States and in Canada.

"Leaving New York for England on one of the large and comfortable steamers of the Hamburg-American line, we had a pleasant week at sea, and, arriving safely at Plymouth in January 1908, reached our home at Torquay a few hours afterwards."

CHAPTER XII

MEXICO

AFTER staying at home for a brief holiday, Forbes Julian found himself summoned to London on fresh technical work. He continued his researches on the development and improvement of the cyanide process, but whenever he could obtain release from professional labours he gladly hastened back to the seaside. Immediately on his arrival in town from Torquay in January he made a report on their American business to the Board of the Butters Company.

His sister, Emily Julian, having been recently appointed principal of the Avery Hill College at Eltham, he was able, during his visits to town, to see her more frequently than had hitherto been the case.

Lady Henry Somerset visited Torquay in March to speak at the Pengelly Hall on her life-work. Hester Julian had frequently met the eloquent temperance reformer at Lambeth Palace and elsewhere, and a few days before the meeting received a letter from her arranging to visit them whilst at Torquay.

The impressive address, describing the speaker's successful efforts for raising suffering and degraded womanhood, aroused strong interest in the Duxhurst work, and on Lady Henry's visit the same evening at "Redholme" further details were heard, remarkable incidents being given of numerous lives that had been rescued and of victims of drink who had been reclaimed.

Most of the early spring was spent in town, but with the approach of Easter Forbes Julian turned his face homewards. In a letter to his wife written on April 3rd, just before returning, a recent request that he would become a contributor to the *Mining and Scientific Press* is mentioned.

Leaving Devonshire soon after Easter for London, he and his wife settled at Hampstead, and (although closely engaged throughout the day) he found, as usual, much stimulus in attending the Friday evening lectures at the Royal Institution with his friend, the Rev. J. O. Bevan. The discourses given by Sir James Dewar and Sir J. J. Thomson were always especially attractive, and it afforded him pleasure to meet the members and their friends in the library after the lectures, to see the microscopic displays and examine the scientific apparatus and the various important exhibits.

The Thursday afternoon meetings of the Royal Society, at which he and his wife were present with their friend, Professor Harley, in like manner enabled him to meet and to listen to papers and discussions from some of the men most distinguished in modern science, those who had added to the sum of human knowledge by piercing the mysteries of nature, the exponents of the two sciences in which he took such keen interest, physics and chemistry, as well as the leaders in other departments of knowledge—experts whose illuminating researches had placed them in the first rank of scientific inquirers, even in an age prolific in great men.

During the summer Forbes Julian and his wife were present at some of the sessions of the Pan-Anglican Congress, and on Sunday, June 14th (the day before the opening of the Congress), heard his cousin, Dr. Moore Neligan, Bishop of Auckland, preach at

evensong at St. Paul's Cathedral. The preacher made an earnest appeal for the fulfilment of Britain's religious obligations as a Christian nation to her colonies and possessions in all parts of the world.

On the following day at noon the opening service for the members of the Congress was held at Westminster Abbey, being conducted by the Dean, Dr. Armitage Robinson.

The Albert Hall was crowded on Tuesday night for the first great evening meeting, when the Archbishop of Canterbury delivered his inaugural address; and the papers and discussions were continued throughout the week.

In the midst of the Congress meetings and of various projected plans for the summer Forbes Julian was suddenly summoned by an urgent cable to undertake work for the Butters Company in Mexico. This was the first separation from his wife (for more than a few days) since their marriage, and at first he endeavoured to postpone the journey until the cooler autumn weather, that she might be able to accompany him; but on learning that the Mexican work could not be delayed, he reluctantly arranged to go alone. On Monday the 22nd he and his wife were present at the Albert Hall and heard several eloquent speakers on the subject of "Christian Truth and other Intellectual Forces," Mr. Balfour, Bishop Welldon, Father Waggett, Canon Hensley Henson, and Mr. Masterman all contributing able addresses. Unfortunately, the traveller had to leave London on the 24th, the day of the concluding service at St. Paul's Cathedral, when the Thanksgiving offerings were presented to the Primate by the archbishops and bishops. A telegram from his wife briefly describing the service reached Forbes Julian on the R.M.S. *Caronia* at Liverpool, and afforded him the oppor-

tunity of keeping in touch with the closing scene of a Congress memorable to the members of the Anglican Church and to those in communion with them throughout the world.

A few days after his departure, and whilst he was still on the voyage to Mexico, a somewhat serious revolt, the first indication of coming trouble, occurred in that unsettled country, which was soon to be convulsed in the throes of civil war. Fortunately, the ill-starred rising of 1908 was of short duration and was speedily suppressed, but the political horizon remained ominous and the smouldering discontent of the people afterwards found vent in open rebellion and protracted and sanguinary struggles, resulting in the deposition of President Diaz and the assassination of President Madero.

The news of this insurrection and tidings of the burning and looting of villages, which reached him on board the *Caronia* through Marconigram, did not cause him the least alarm or the thought of postponing his projected journey; it rather added an atmosphere of adventure to the expedition and that slight sense of danger which only serves to heighten its interest. His wife, however, was so seriously concerned that she sent a cable from England to reach him on landing in New York, begging him to make inquiries there before proceeding further.

He cabled back immediately to relieve her anxiety, "Travelling safe"; and would have started at once for Mexico, but was unexpectedly detained in New York for a few days by a telegram from Mr. Charles Butters, who was crossing the American continent from San Francisco and was anxious to meet him.

In a letter to his wife written before reaching New York, from which extracts are given, the traveller describes his voyage on the R.M.S. *Caronia*, a fine

steamer of the Cunard Line, and mentions a chess tournament by wireless telegraphy between the passengers on this vessel and the S.S. *Teutonic*.

ON BOARD R.M.S. *Caronia*,
1st July, 1908.

We stayed only a very short time at Queenstown. The morning was brilliant, which helped to make the harbour (which is so familiar to me) look lovely, and we skirted all along the south coast near enough to see the houses. I never saw the Irish coast to better advantage. A great number of gulls followed the ship, but in the night we ran into a fog and had the horn blowing at intervals. The birds (wise creatures) thought Ireland was good enough for them, and so they ceased to follow us. . . . On the 28th, Sunday, we had a strong land breeze which gave the air a deliciously crisp feeling. The sky was almost cloudless. At about 3 P.M. there was a partial eclipse of the sun visible. In the morning there was service conducted by the captain in the first-class saloon. The choir was accompanied by a pianist and four stringed instruments, and at the conclusion of the service one of the choir sang as a solo the hymn "Abide with me."

The 30th was a glorious day with a very pleasant temperature. In the evening a concert in the first-class saloon was a great success. Afterwards there was a dance on deck. . . .

To-day the weather is superb, and delightfully warm for lounging on deck. It is expected we shall land to-night, in which case I shall put up at an hotel in New York, and take the train to-morrow which makes a connection at St. Louis with the one for Mexico City.

This ship is splendid, as steady as a rock, with three fine decks. The officers and stewards are all very civil and the passengers are pleasant, Americans predominating.

We saw very few ships, but the White Star liner *Teutonic* is following us and has been within reach by wireless telegraphy for the past three days. There has been a chess match between passengers on the two ships, which seems rather a wonderful thing. It is not finished yet. . . .

I made the acquaintance of Mr. A. D. Hall, whom I recognized as one of the British Association members who read a paper on Agricultural Chemistry at Section B at Cape Town.

He is going to America to give a series of lectures at Cornell and Boston, but he hopes to return in time for the Association meeting in Dublin.

My neighbour at meals is a New York doctor, a typical American who has been to Europe for a rapid trip. Opposite me is an energetic American lady who has been travelling with her aunt all over Europe. The old lady is over eighty.

Landing in New York at the beginning of July, he was in time to witness those annual celebrations at which the American Eagle flutters its wings so energetically, and in writing home he alludes at the close of the next letter to this exuberance of patriotism :

MURRAY HILL HOTEL,
NEW YORK,
3rd July, '08.

I landed yesterday morning and went to the office to hear if there were any instructions about proceeding to Mexico. I found a wire had been received from Mr. Butters (who is on his way to New York from San Francisco) asking me to wait until his arrival. . . .

I got your cable safely; it was just like you, dearest, to be anxious about me when you saw in the papers about the Mexican revolt. These sorts of things in all the Latin-American States are always purely political against their own people, and are more or less of a perennial nature. Strangers are never endangered by them, and there is not likely to be any more fighting for another year. I shall probably not be leaving here until the 6th or 7th, but I will take all precautions possible to ensure safety. New York looks so familiar that I feel as if it were only yesterday that I saw it last; a few new skyscrapers mark the only change. To-morrow is the greatest day of the year over here, and everybody is getting ready to wave their star-spangled banners and let off fireworks.

Two days later he writes again, on July 5th :

. . . On Saturday, being Independence Day, everyone devoted the time to letting off fireworks and keeping up New York's reputation for noise. The newspapers congratulate

the country on the day having passed off so satisfactorily; only about fifty people were killed and thirteen hundred injured! . . .

In the two following letters to his wife he describes the days preceding his journey and the interviews with his friend Mr. Charles Butters, for whose firm he was engaged in giving scientific information on technical matters to their lawyer, Mr. Binney of New York, in conjunction with the distinguished expert Dr. Chandler.

The work he was undertaking for the firm in Mexico was of somewhat similar character to that carried out the previous autumn in the United States. The Butters Patent Vacuum Filter Company and the Moore Filter Company were now engaged in a metallurgical patent dispute of the first magnitude. The questions involved were of so highly technical a character that, though interesting to experts, they would hardly be attractive to ordinary readers, and it is not intended to do more here than to refer to them in these general terms. Forbes Julian alludes in his letters from time to time to the legal proceedings in New York, and to Dr. Chandler and other experts whom he met in connection with the scientific and technical evidence being collected.

MURRAY HILL HOTEL,
NEW YORK,
7th July, '08.

Mr. Butters arrived on Sunday morning and I saw him in the afternoon. He explained that he wired me to await his arrival as he thought he might be useful in giving me information regarding my trip to Mexico. Owing to the revolt a little delay might be beneficial, as the Vice-President of Mexico, whom I have to see, will be so much engaged for a week or two that he may not be able to devote as much time to our matters as we should like. . . .

MURRAY HILL HOTEL,
NEW YORK,
10th July, 1908.

The people here are envying me the trip to Mexico, and Mr. Binney wants me to find some pretext for taking him with me. I should much prefer having you to anyone else in the world. . . . I have bought a little Kodak which will take photos about the size of a post card. There are many mines near Mexico City that I may have time to visit, and I want in particular to take photos of parts of the mining "plants." It will also be useful for taking pictures, so that you may learn what the country is like.

Mr. Butters has asked the secretary of the American Club to give me the privileges of a member during my visit to Mexico City. If I can get a room there it will be much pleasanter than living at an hotel.

I am enclosing you a few photos of New York skyscrapers. The Metropolitan Life building is about 40 feet higher than the Singer building. It is, however, not yet quite completed. They are now talking of putting up a building 909 feet high near Wall Street. The Tower of Babel after that! . . .

I have booked to leave to-morrow (Saturday), and expect to arrive at 6.30 A.M. next Thursday. . . . I am very much grieved to hear of the deaths of Sir Arthur Havelock and Mr. Brooking Rowe. Sir Arthur had been failing for some time, but I had no idea that Mr. Brooking Rowe had been ill. He will be a great loss to the Devonshire Association.

Death had been busy amongst his circle of acquaintance, several having recently passed into the unseen world, and he felt very keenly the loss of the two friends referred to in the last letter. Sir Arthur Havelock had always been glad to discuss colonial matters with him, as already mentioned. Mr. Brooking Rowe, of Castle Barbican, near Plymouth, was a well-known Devonian antiquary and one of the original members of the County Association, which was meeting this month under the presidency of Lord Monkswell.

In the following letter home the traveller gives an account of his journey to Mexico and of his first impressions of the country and its people.

THE AMERICAN CLUB,
CITY OF MEXICO,
18th July, 1908.

I left New York on Saturday, July 11th, by the ferry for the Pennsylvania Railroad Station in New Jersey. I caught the St. Louis Limited train, which was made up only of Pullmans, a dining-car, and an observation-car. The train was quite luxurious. We passed through some charming scenery, and after leaving Philadelphia got into the most English bit of country that I have seen out of England. A pretty little place called Malvern reminded me of our visits to Worcestershire. The country round is not unlike the old place. The day was hot, but not disagreeably so, and at night I managed to get enough sleep to feel rested. I had the top berth and a very pleasant man, Mr. Gilbert of St. Louis, a publisher of law books, had the lower one.

Sunday was very hot, well over 90°, but the humidity was low, so that it was not as oppressive as New York feels at a much lower temperature. There was some dust, but on the whole it was not disagreeable. Mr. Gilbert and I became very friendly, and he wanted to know if I could not stay for a day or two at St. Louis, when he would put me up at his club; but that, of course, was impossible. There was a young fellow—a Mr. Clark of New York—sitting in the section opposite ours, and he joined in our conversation. He turned out to be a very interesting man, an electrical engineer, who had seen a great deal of this side of the world. We all three remained together during the journey. Our train arrived at St. Louis by 4.30 P.M. My train did not leave until 8.15, while Mr. Clark's train for Dallas, Texas, did not leave until 8.32. On Mr. Gilbert hearing this, he invited us both to dine with him at his club and showed us a little of the town. He then came back to the station and saw us off. He is a really nice fellow, and I hope I shall be able to do something for him when he visits London. That night in the train was oppressively hot, but in the morning it was much cooler. I believe we passed through several towns in the night, and

on waking in the morning we were at a place called Little Rock, Arkansas. From this point we passed all day through forest land, with clearings in places where there were villages and cotton and maize plantations. At about one o'clock we arrived at the most important town for the day, named Taxakana, a border-town between Arkansas and Texas; here we stayed for two hours. The afternoon became thundery, and we ran through a tract of country that had had heavy rain. The moisture in the air was excessive and prevented sleep until after midnight, when the air cooled.

On *Tuesday* morning we arrived at San Antonio, and here I saw the first signs of our approach to the Mexican frontier. The buildings were in a different style from anything I had passed and the people were of mixed race. No doubt there is a good deal of Mexican or Indian blood in them. There is no American bustle and stress here, as the climate is enervating. . . . We now got into the land of the cactus and the palm with virgin scrub, and ran through a hundred miles of it before dark. At about 5 P.M. we arrived at Laredo, an important town, and now there was nothing between us and Mexico but a river. By 5.30 we reached New Laredo, just across the river, and here the baggage was examined by the Mexican officials. At the door of the Custom-house—a wooden chest—were three soldiers in dusty white uniforms leaning with fixed bayonets against the pillars of the door. After the luggage had been examined they marched off in fine military style. The officials were very polite and attentive, but very casual. They all speak Spanish and a little English. My luggage was checked through to this point from New York, and after passing the Customs I had it re-checked to Mexico City, when I thought all formalities were over. However, up came one of the men to say an officer was waiting in the train to examine my hand luggage. Having got that over, I went on to the platform, where another man came up to accost me with a large sheet of paper. He spoke about as much English as I spoke Spanish. He wanted to know my name, where I came from, my business, why I was going to Mexico, my age, whether married or single, &c. Most of the answers he did not understand, but wrote something down in Spanish. When I told him my age was 47, he repeated the words several times and then wrote down 37. . . . From

this point the journey was intensely interesting. . . . At Laredo the temperature was about 90°, and from that point on the land rose and the air became cool. At 8.15 P.M. we stopped at a little roadside hotel, where I had my first Mexican meal. . . .

Wednesday. When I woke up we were in the midst of yuccas, aloes, and cactus. On either side of the railway were low ranges of hills, while the land between was almost level. The climate was deliciously invigorating, very much like the high veld in South Africa. There were tiny villages every few miles along the line. Whenever the train stopped a number of children and poor blind and crippled people came and begged. It all presented a great contrast to the thriving cities in the United States. Every now and then we saw a small cemetery, with imposing monuments and occasionally a large cross standing in the midst. As we proceeded further the people looked better dressed and more prosperous, which is probably due to their finding employment at the mines in the vicinity. Food seemed to be plentiful enough, and scores of women and children surrounded the train at every station, selling fruit, cakes, and various hot dishes. The houses everywhere looked more or less dilapidated, but the buildings with a good deal of colour, and the bright and varied dress of the people, produced a charmingly picturesque effect. At San Louis Potosi, a town of about seventy-five thousand inhabitants, there were several important buildings. We also passed another large city called Monterey. The whole day the weather was delightful and the scenery most interesting.

Thursday. We were awakened at 5.45 A.M. as we were on the outskirts of Mexico City. I felt as though I could have gone on travelling for another six days. It was a bright sunny morning, and the drive to this club gave me a good impression of the city. All the older parts seem full of interest. Our lawyer, Mr. Wiechers, has shown me a few of the old buildings and has promised to take me to see everything he can. I could have no better guide, as he seems to know the history of every building in the city. There are a great many fine churches, most of them dating from early Spanish days The place is brimful of attractions for the antiquary, and the people are most friendly and polite. . . . I have had an audience with the Vice-President and some other State officials, and I shall probably also have to see President Diaz.

The next letter, written on his wife's birthday, contains references to Chapultepec, famous for its associations with the Emperor Maximilian and earlier rulers of Mexico. Further accounts of the scenery and vegetation are also given and observations on the Mexican people, with allusions to Mr. Wiechers, who showed much kindness and attention to the traveller.

THE AMERICAN CLUB,
CITY OF MEXICO,
24th July, 1908.

I sent you a cable last night so that you might have something from me at breakfast this morning. . . . This being your birthday, I am giving myself a half-holiday. I would take a whole day, but I have an appointment with the Minister of the Interior which must be kept.

. . . . . .

It is very lonely going about without you; I am always wishing you were here, and especially when I see some of the interesting old churches which abound at every step.

. . . There is no oppressively hot weather here; it is usually 50° to 60° at night and 60° to 70° in the day-time. The winter temperature is, I am told, very much the same as the summer, but the nights are colder, occasionally with a little hoar-frost. The vegetation is subtropical and all our subtropical Torquay plants are to be seen here, only appearing very much more luxuriant and abundant. There is a pretty little park in the middle of the town, in which the dracænas, yuccas, and palms stand 50 feet high. Plumbago grows like a weed, and a pretty creeper (which at home only grows in greenhouses) runs over the tallest trees, producing a charming effect. In this park an excellent band plays every day between 11 A.M. and 1 P.M. There are between fifty and sixty performers, and the music appears to be much appreciated. A portion of the ground is covered with a long awning, and this enclosure is occupied by the Mexican better class for social intercourse while the band plays. The poorer people surround the bandstand and applaud every well-executed piece.

The Mexican upper class are very exclusive and they have charming manners, but they will not associate with the ordinary

American business man, no matter what his wealth may be. Practically no American business men are admitted into their society; probably this is partly political and patriotic, but the result is that the Americans keep entirely to themselves. There are small colonies of British, French, and Germans, and these mix with the Mexicans.

In the afternoons, especially on Thursdays and Sundays, at about 5, there is a stream of carriages going out to historic Chapultepec, with its beautiful park, about four or five miles away, reached by a wide handsome avenue. Between 7 and 8 they return to the town and drive up and down a street which is about as long and as wide as Bond Street. This is *the* Bond Street of Mexico City. Between these hours the traffic is often quite as dense as in the London Bond Street in the season. There are fine shops here, and one can buy almost anything. Judging from the prices in the windows, they do not seem to be very different from London prices. The cost of living in hotels is only about half that of New York . . . and I never had more obliging and attentive service anywhere. The usual time for the Mexicans to dine is about 9 o'clock.

There is a splendid service of tramcars here, and cabs are plentiful, usually victorias with a few ordinary "growlers." There are two classes, the red and the blue, the difference being that the blue ones look a little smarter and charge nearly double. I drove out in one with Mr. Wiechers the other day. . . .

I have a comfortable bedroom at the club here, and everything is kept spotlessly clean. The maids and waiters speak only Spanish, but they are wonderfully quick at finding out what one wants, and the head waiter can speak English. . . .

In another letter home, written at the end of July, a description is given of the Catholic cathedral of Mexico City. It is known as the Metropolitan Church of Mexico and was consecrated as the Church of the "Ascencion de Maria Santissima," being the largest and most important cathedral of this Spanish republic. The building was commenced as early as 1573 on land purchased by Franciscan friars. It was completed and solemnly inaugurated nearly a century later.

The traveller frequently visited the cathedral. The Sagrario, to which he refers, adjoins it on the east. He also inspected most of the churches and public buildings. A remarkable feature is presented by the celebrated zodiac or calendar, which was allowed by one of the Spanish viceroys to be built into the cathedral, but is held to be the property of the National Museum. It is of basalt, is of great height, and clearly shows the division of time into cycles, years, and days.

THE AMERICAN CLUB,
CITY OF MEXICO,
28th July, 1908.

. . . Since writing last I have had a chance of seeing a little more of the city. On Friday and Saturday I was busily engaged in preparing a Report, but on Sunday I had the whole day to myself, and I rambled about on foot into all sorts of places. All the poorer class of shops, the markets, and all places wherever eatables are sold, are open on Sundays, which seems to be the principal marketing-day of the week. I wandered into one of the poorer quarters, where the streets were crowded with people, mostly Indians. It was more like a fair than anything else, and the people danced about like children just out of school. In my wanderings I came across innumerable churches (mostly in a decaying condition) and other public buildings. I was longing all the time for you to be with me. . . . In the morning I went into the cathedral—a fine structure which contains many objects of interest. . . . There are numerous oil-paintings there, and some are said to be very fine, but they are so hung that one cannot see them to advantage. There is an immense amount of gilt and a good deal of colour, which produces rather a gaudy effect.

Mass was going on at one end of the cathedral whilst I was there. I found a door through which people were streaming and I followed the current, which led to an old chapel in which some famous preacher was in the midst of a sermon. He appeared to be very eloquent, and I should have liked to understand what he was saying. This chapel is called the Sagrario and is very ornamental outside, whilst the inside looks decaying—in fact, the seats looked dangerously rotten. . . .

In front of the cathedral is a large plaza planted with trees, under which are shady seats. In the middle there is a band-stand. The band seems to play the whole day, and the place is crowded with the poorer classes, who are very orderly and appear greatly to enjoy the music. In the evening the numerous lights amongst the trees produce a pretty effect. . . .

At the beginning of August he describes a visit to the neighbouring sacred shrine of Guadelupe, and the anniversary celebrations which he witnessed in honour of the patriot Hidalgo, whose memory is held in affectionate regard by the people. An interview with the Minister of Fomento is also mentioned.

THE AMERICAN CLUB,
CITY OF MEXICO,
2nd Aug., 1908.

I want to finish a Report I am writing for the Government officials, which ought to be sent in as soon as possible. I am expecting to have some time after this is completed, and I shall then be able to see something of the neighbourhood. A few days ago Mr. Wiechers took me to Guadelupe, a village reached by tramway, one of the most interesting places near here. There is a small hill there, on which is a graveyard where only the most famous people have been buried. We arrived after the gates were closed, and the man said it would be impossible for us to enter. A dollar coin had, however, a miraculous effect, and the gates flew open. Near by is the spot on which an Indian declared that the Virgin Mary appeared before him and impressed her image on his garment.

This happened two or three hundred years ago, and immediately a chapel was built on the spot, and the image was framed and placed on the altar. Thousands of people yearly have made pilgrimages to this place ever since. It is a simple-looking little chapel containing little that is attractive. A few years ago some rich Mexicans built a magnificent church at the foot of the hill, and the image was carried down amidst great pomp and ceremony and placed on the altar of the new church, which is certainly very beautiful both inside and outside and has nothing gaudy about it. The pictures are very fine, and there are silver railings round the altar. In the

village there is a perpetual fair which is entirely supported by the pilgrims. . . .

On July 30th, which was the anniversary of Hidalgo's death (Mexico's national hero), there was a grand procession. It was about a mile long, and was attended by prominent citizens and the representatives of various societies. The last party in this concourse carried picks, shovels, and garden-rakes; what they represented I have not yet discovered. One of the most remarkable things about the procession was the great floral display. There were hundreds of enormous wreaths, about seven feet in diameter, made of lovely flowers. These take two men each to carry, and are sent by the various institutions in the town.

Since writing to you last I have had an interview with the Minister of Fomento. He is a man of importance here, and can do a great deal, if he wishes, to assist my work. He is very genial and can speak English, and we were good friends immediately. Few of the older generation here can speak English, but the younger people of the upper class all learn it now. Hardly any of the poorer people speak English, the waiters and servants knowing as a rule only Spanish, but they are used to dealing with people who know little or no Spanish. In the better-class shops there is usually some one who can speak a little English. . . .

It will be seen from the next letter how greatly he enjoyed the wealth and profusion of the Mexican flowers and foliage, which render the country so attractive to all lovers of botany:

THE AMERICAN CLUB,
CITY OF MEXICO,
5*th Aug.*, 1908.

. . . I have just finished my Report, and it is now being translated into Spanish. While the Government officials are studying its contents I hope I shall be able to see some of the mining-fields, as I have letters of introduction to the leading mining men. There are a great many places of interest within a day's journey from here, and I should like to see them all. I wish that you were with me! . . .

Mexico is truly the land of flowers. I have never seen such profusion in any part of the world. There is a flower-

market next to the cathedral where only flowers are sold, and they are exceedingly beautiful. The church floral decorations are very elaborate. Some churches keep a staff of decorators perpetually arranging the flowers. A church just behind the club was beautifully decorated on Sunday. The entrances alone must have had a ton of cut flowers about them.

We have had lovely weather all the time I have been here, but thunder and rain often occur in the night. Even in the bright sunshine one can walk rapidly without discomfort—due, no doubt, to the high altitude and the dryness of the air. There are no hills in the city, but all round is a beautiful range of mountains. . . . I find the upper-class people here very nice. . . . The middle-class women wear hardly any kind of headgear. They are very simply dressed and wear black shawls of a thin material, which is much more becoming to them than colours. The great mass of the people are, of course, Indians, and their dress is more picturesque than neat. Every evening, between 7 and 9, there is a cinematograph entertainment near the entrance to the park, at which thousands of these Indians congregate. They seem to be very easily pleased. Close to the same spot the National Theatre is being erected, which will be an ornament to the town. Opposite the theatre is the General Post Office, one of the finest buildings in Mexico City. . . .

During his stay the traveller often visited the National Museum of the city, bringing home many photographs of the remarkable remains of ancient Mexico exhibited there, including the "sacrificial stone," the image of the god Chac-Mool, and other interesting remains from Chichen-Itza.

CHAPTER XIII

MEXICO—*continued*

UP to this time his work had lain wholly in the capital, but early in August he left Mexico City and during the following week visited Pachuca, which has long been noted as a mining centre. Here he was received with the utmost cordiality and kindness by Mr. Gerault, Mr. Merrill, Mr. Narvaez, and other mining men of the district, to many of whom he was well known by name, and he describes his travels in a series of letters to his wife.

PACHUCA, MEXICO,
8th Aug., 1908.

. . On Friday, 7th, I managed to get my Report delivered to the officials. As I should have nothing to do while they were deliberating on it, I hurriedly packed my things and left Mexico City for Pachuca, a famous old mining camp. It is about two hours' run north of Mexico City. I could get no advice about the hotels, but I saw the names of two mentioned in the Railway Guide. Just before arriving I asked a gentleman in the train which of these two was the better. He laughed, so I then asked which of the two was the worse. "That's about it," he said, "but you might try the 'X.'" On arriving I made for the "X," and after asking several Mexicans the way, I found myself in a square surrounded with trees containing a bandstand all lighted up. On an imposing-looking building I distinguished the words "Hotel X." After one or two unsuccessful attempts, at last I discovered the office. In a Mexican hotel there is a courtyard called the patio in the middle of the building, and all the rooms open into the patio. There are balconies for the upstairs rooms. You therefore walk out of your bedroom into the open air, and every part

of the hotel is reached from the patio. There was a girl in the office, and I asked her for a bedroom. She replied in Spanish. She then called a little boy about ten years old, who said to me in good English, "What do you want?" I replied, "A bedroom." "Do you want one with a view from the window?" he next asked. "Yes," said I; "give me the best you have." With that another little boy picked up my bag, and away they both ran to show me my room. It turned out to be a very good bedroom with a pleasant view of the hills, overlooking the square. . . . Next morning I set off to present my letters of introduction. I had one to Mr. Merrill, manager of one of the largest mines here. On presenting the letter we recognized each other as having travelled in the same train the evening before; he was the man whom I had asked about the hotels. We had an interesting conversation, and he sent me two letters of introduction in the afternoon.

I next went to see Mr. Narvaez, to whom also I had an introduction. He is a Mexican and does not speak English very fluently. As soon as he heard my name, however, he gave me a very warm welcome, and politely said I was the best-known man in the mining world in Pachuca. I spent the whole afternoon with him going over his works and talking shop. He introduced me to several others. After that, at about six o'clock, I called on Mr. Gerault, the manager of a famous mine. He is a charming man—a Frenchman by birth, who has lived nearly all his life in Mexico. We talked until about 7.30, and then he offered to drive me to the principal mines next morning. He told me how delighted he was with my book, and said all sorts of pleasant things about it. Next morning I met him with his carriage with four mules. We drove about four miles up-hill to his mine by a winding and picturesque road. On the way we called at all the mills and met the managers. It was all very interesting to me. Mr. Gerault took me down his mine, which is about 400 feet deep, and we came out through a long tunnel. A trolly and two mules met us in the tunnel, and we were driven the whole way. At the mouth of the tunnel the carriage was waiting for us, and Mr. Gerault asked me to join him and his wife at dinner. She is a Mexican and is very nice, but speaks hardly any English. . . .

The next letter gives a further account of the hearty hospitality of the mining camps, and is written from the hacienda, or Mexican farm, of Mr. Berrislope.

HACIENDA BERRISLOPE,
MEXICO,
13th Aug., '08.

. . . I had been expecting to hear that the Government officials had finished their deliberations over my Report, which would leave me free to return for the British Association meeting. If I were to start now I could get to Dublin in time, but we have just heard that it will take ten days before we may expect to learn what the officials propose doing. I shall therefore have to stay, much as I should like to be with you in Dublin. . . .

So far everything has gone on satisfactorily for the ultimate success of my mission, and I am enjoying my stay amongst the Mexicans. They are a very interesting and agreeable people, and the country is delightful. My trip to Pachuca gave me some idea of the manner in which the people live. I must now give you an account of the last two days I had at Pachuca.

On Monday I went to the Loretto Mill and presented a letter of introduction to Mr. Brown, the manager. This was given to me by Mr. Merrill. When I arrived at the mill Mr. Merrill himself was there and asked Mr. Brown to show me everything. I had an interesting morning, and was introduced to all the heads of the departments. As I was leaving, there were four of us talking together, one an Englishman, another a New Zealander, and the third a Canadian, so that we were all British subjects. I went to lunch with Mr. Merrill, who showed me over the house, which is quite a palace. It was built by an old English company about a hundred years ago. It was recently sold to his company, together with the mines of the English company. It would accommodate about fifty people, and the banqueting-hall holds about two hundred. The old company used to give periodical banquets, and when they sold the house they disposed of some tons of plate made of silver from the local mines. There is a bedroom preserved as it existed forty years ago, when the Emperor Maximilian used it on his visit to Pachuca. The furniture is not pretty, but is massive and quaint. Mr.

Merrill offered to send me to another of his company's mills at Guerrero—about ten miles by road. So at eight o'clock next morning Mr. Brown called for me at the hotel with a carriage and four mules, and we drove over a mountainous road through lovely scenery. Dotted about on the hills in all directions were indications of mines that had at one time existed and others that were still working. Some of these mines have been in operation for four hundred years. In two hours' time we arrived at Guerrero, which is a straggling village situated in a beautiful valley. I am told a good deal of it was built by the English company a hundred years ago. The works are surrounded with massive walls built after the style of a castle in the Middle Ages. This was owing to the miners having to protect themselves against brigands.

Mr. Henderson, the manager, had everything ready for my reception. I had an interesting morning going all over the works and being introduced to the staff. In the office I met a very pleasant Englishman, who knew me by name when he was in South Africa. He had been for several years there with Lewis and Marks. We had an interesting conversation. I got back to Pachuca soon after 3 o'clock, and that gave me time to call on Mr. Merrill to say good-bye. I never met kinder people than those at Pachuca. Everyone invited me to stay if I should ever return there.

In the train on my way back to Mexico City a mining man came and asked me if I were not Forbes Julian. He is an Englishman who had been on the Rand, and is now settled in Mexico City as a consulting metallurgist. We had an interesting mining discussion on the way. He offered to help me with introductions, and said he would make me a temporary member of the British Club. As we were leaving the train he introduced me to another mining man.

On arriving in Mexico City I went straight to Mr. Wiechers, who informed me that, as there was not much likelihood of the Government officials coming to a decision in our case for some little time, he had decided on going to the hacienda (farm), and invited me to accompany him. We caught the evening train, and we arrived next morning at a junction called Rincon. Here we had to wait for a train to take us by a branch-line to Pozos. This took three hours to accomplish.

On arriving at Pozos we were the only two passengers left

in the train, and we expected a conveyance to take us to the farm, fourteen miles away. However, there was none waiting, but an Indian, who carried our baggage, informed us that the carriage had come in to meet Mr. Wiechers the day before. In the town this was confirmed by a storekeeper. We therefore concluded some mistake in the date had occurred, and hired a man to drive out to the farm, to ask them to send the vehicle for us. In the meantime we discovered a most quaint little hotel. It was beautifully clean, although everything in the place looked worn out.

The town must have had a large population at one time, but it has now a deserted appearance. It contains three good-sized churches that are open, and many that are closed. The town was supported by a number of small mines, which a few years ago were closed as non-payable. The people remaining seem to be very poor.

By 6 o'clock our vehicle turned up. It would seat only two, and was accompanied by a servant and a mule. By 6.40 it became quite dark, and we found the man on the mule of great service, as he rode ahead of us and stopped at every bad part of the road to warn us. We arrived at our destination by 9 o'clock, and were welcomed by a son of the proprietor of the farm, who is a most good-tempered and genial man. He speaks a little English, but no one else on the farm speaks anything but Spanish. . . .

The middle of August found the traveller at Guanajuato. In writing home he recounts his further experiences at the Berrislope hacienda, and his visits to the historic city of Queretaro and to the quaint mining city of Guanajuato, which is built in a narrow ravine, the houses being crowded in steep streets like stairways.

In the midst of these fresh and fascinating scenes and the pressure of continuous work his thoughts still turned constantly homewards. As an Irishman, the meeting of the British Association in Dublin naturally attracted him strongly. He mentions in several letters that if he had been in the United States he would have crossed the Atlantic with the object of attending the

gathering. His wife wrote to him describing the scientific addresses and lectures and the social functions, including a garden party given by the Lord Lieutenant and the Countess of Aberdeen at the Viceregal Lodge, and some performances by the Irish Actors at the Abbey Theatre, together with an account of her northern tour, taken at the conclusion of the meeting, through the fine scenery of the Giant's Causeway, and a southern journey to his birthplace, Cork.

Wood's Hotel,
Guanajuato, Mexico,
19*th Aug.*, 1908.

. . . I have had a delightful experience of life on a Mexican hacienda. The size of a farm here may be anything from about one thousand to thirty thousand acres and the buildings are of great extent. They consist of a dwelling for the owner, who also lodges his staff, a store of general merchandise, stabling, a church, granaries, and huts for the peons (the Indian labourers). The dwelling is built to form a square, with a large quadrangle in the middle. At each outside corner of the block there is usually a small tower containing rifle-slots, from which the building could be protected in case of attack from brigands. The doors of all the rooms open into the quadrangle, and the windows look outside the building. A great doorway leads into the quadrangle, from which one enters any room. Adjoining is a large vaulted building (that looks like a cathedral inside) for storing the grain. They usually get three crops a year here, and these buildings will sometimes contain many thousand pounds' worth of grain. The peons build their own huts (usually of raw brick), which are mere hovels. On Berrislope's hacienda there are about one thousand of these people, and it is not uncommon to find five thousand on one hacienda. No farm is complete without its church, but there is seldom a priest to any church outside the town.

The owner of a hacienda is always expected to be "hail-fellow-well-met" with everyone. He generally carries an air of importance about him, but dresses little better than a farm hand. All the staff dine with him. Breakfast is to be had

at any time from 4 A.M. to 7.30 A.M. This consists of eggs, rolls, and boiled milk to which a little strong coffee is added to suit the individual taste. Dinner is served from 1 to 2 o'clock, and usually consists of soup, a dish of rice and eggs with chillies, boiled meat, roast fowl, grilled cutlets, beans (a staple dish), and generally some fruit and coffee. Supper begins about 8 o'clock, and consists of one or two meat dishes and abundance of boiled milk with coffee. At 9 o'clock everybody is in bed and fast asleep. The peons live almost entirely on vegetable food, consisting of beans, cooked sometimes with a little fat, and tortillas (a thin cake made of Indian corn and cooked on a hot stone). They also devour quantities of cactus-fruit, which abounds everywhere. The cost of a peon's food is about twopence per day. The peons spend all their spare cash on pulqué, an intoxicating drink made from aloes. In the towns the poor Indians are completely demoralized with this stuff. They are small wiry people who are able to carry great weights—often 150 lb.—for miles. They are born agriculturists and look their best behind a plough.

Mr. Wiechers and I left the farm on Saturday and returned by Pozos to Rincon, the same route by which we came. Mr. Berrislope and some friends accompanied us on horseback as far as the boundary of the farm. This is an old Mexican custom. At Pozos we went to the same little hotel as before. At Rincon we managed to get beds in the neighbourhood, and were up in time to catch the train which passed at 6.16. This brought us to our destination in an hour and a half, where we were met by a friend of Mr. Wiechers, who drove us to his hacienda. This is a most beautiful farm, kept in perfect order. After breakfast we were driven over it. . . . I decided to go on by myself to Guanajuato, a mining camp that has been famous for four hundred years. I accompanied Mr. Wiechers as far as Queretaro, an historical old town. . . . I found a large hotel, where, of course, nobody spoke English. . . . I had time to see something of the town of Queretaro next day, which contains many fine old churches. I caught my train at 4 P.M. and arrived here at 9 o'clock. . . . This is one of the most quaint, old-fashioned cities imaginable. There is not a square of it that is level nor a street that you could see down one hundred yards. . . . I have met several mining men, but have still many more to see. . . .

How I should love to slip over to Dublin and surprise you! I know it will be a delightful meeting. . . . There would have been no difficulty in my going to Dublin only for a week if I were in New York, but it is too long a journey from here. . . .

After inspecting the interesting mines at Guanajuato and meeting many metallurgists there, he paid a visit to Guadalajara, which, with the beautiful gorge or cañon within easy access, affords all travellers much enjoyment who are fond of fine natural scenery. He also had a great love of architecture, and was therefore glad to have the opportunity of taking photographs of the cathedral at the latter place, where he was fortunate in having the companionship of an American acquaintance, Mr. Wheateley, who spoke Spanish. This was a great assistance, and rendered the visit even more agreeable than it would otherwise have been. Forbes Julian himself was not a bad linguist: as a schoolboy he had received the usual grounding in Latin and Greek, he also knew French and German fairly well, and he acquired sufficient mastery of the Italian and a slight knowledge of the Spanish language, which proved helpful for ordinary travelling purposes.

At Guadalajara he was delighted with the pottery, of soft grey tint, and notwithstanding its fragility brought home many specimens. It is polished but unglazed. The manufacture of this pottery is carried on in several parts of the country, and the various coloured clays and different methods of treatment produce many pleasing varieties.

MEXICO CITY,
26th Aug., 1908.

. . . I believe I shall not be wanted here after about September 2nd, and I shall try to see the Mitla remains near Oaxaca. . . . I have been delighted with everything I have seen, and I am taking photographs to give you some idea of Mexico. . . .

I arrived late at night at Guanajuato, and in the morning called on Mr. Bryant, the general manager of a large group of mines. He was just leaving for the United States, and so I had only a few minutes' conversation with him. His right-hand man, Mr. Butler, however, was instructed to assist me. He showed great kindness in helping me to see matters of interest in mining, &c. . . . Another day I spent with Mr. Van Law and Mr. Callard, two interesting young fellows, and we talked shop the whole day. I also called on Mr. MacDonald, an Irishman; he is very genial and showed me all over his mining works. . . . Guanajuato is a most interesting city and contains some very ancient buildings. It is said that the mines were worked in the days of the Aztecs, and in 1536 the Spaniards took possession of them and founded the town, which contains several very fine churches, two theatres, and some nice-looking residences. Nearly three-fourths of the population are Indians, who live in their usual little hovels, which are situated in narrow winding alleys that go up and down hill in the most extraordinary manner. It is a most densely populated spot. On either side of the town are high hills, dotted over with huts amongst the cactus vegetation.

I left Guanajuato in pitch-darkness for Guadalajara, and arrived at a junction, where I found I should have to wait until 4.20 A.M. With the help of the train conductor I got into a comfortable little hotel . . . and at 5.5 I arrived at another junction called Irapuato, which is on the main line to Guadalajara. The train had not gone very far when an American came and asked me if we had not met the day before at Guanajuato. I recognized him as a man to whom I had been speaking when buying some post cards. We sat together for the rest of the journey and agreed to go to the same hotel. His name is Wheateley; he is a lawyer from Spokane, Washington State, and exceedingly pleasant, and as he speaks Spanish, I found him of great assistance. We rushed round Guadalajara in true American fashion and made a great many snapshots, as he is an enthusiastic photographer. Guadalajara is a beautiful town and contains a large number of interesting old buildings. It has a remarkable cathedral that is some 350 years old. I have taken several photographs of it. We were shown (in the cathedral) a famous painting by Murillo. Mr. Wheateley had a general letter of introduction, and he

Photo by H. Forbes Julian

CATHEDRAL, GUADALAJARA

Photo by H. Forbes Julian

INTERIOR OF CATHEDRAL, GUADALAJARA

handed it to one of the priests, who passed it on to some dignitary of the Church, and he came and offered us facilities for taking photographs. He spoke English fairly well and told me that he had been educated partly at an English college.

Our hotel proved very comfortable, and is kept by a German and run in German fashion. We had meals in the open air, on a balcony, and pigeons walked about at our feet picking up crumbs all the time. Our waiter, who rejoiced in the name of Prospero, was quite a character and very entertaining. A young Scotsman and his wife sat at the same table, and when he heard my name he asked me if I was Julian of Julian and Smart's book. He turned out to be a mining man. . . .

One morning we went by train to a magnificent gorge or cañon. It was a delightful run through beautiful country. We had travelling musicians on board who enlivened us most of the time. The gorge is full of tropical and semi-tropical vegetation and is a grand sight; the foliage is gorgeous, giving a splendour to the scene that is indescribable. . . .

The climate at Guadalajara is superb and several degrees warmer than Mexico City. We left there after having spent some very pleasant days together. . . .

A few days later he visited Orizaba, in which place he found much that was attractive on account of the quaint houses and streets, with the picturesque surroundings near Popocatepetl. Originally it was a Chichimec Indian town, its former poetic name, Ahauializapan—"joy of the water"—being derived from the fact that here many mountain streams cross the valley. This city has a pathetic interest, as it was one of the favourite resorts of the unfortunate Emperor Maximilian and the Empress Charlotte. Writing home on August 31st, the traveller says:

I am now at Orizaba (about eighty miles from Vera Cruz) in the midst of grand mountain scenery. This is a very quaint and picturesque town, and is near the snow-capped volcano of Popocatepetl. To-morrow I am going to Puebla, thence I take train to Oaxaca to see the remains of ancient Mexico. . . .

He was now approaching the most noteworthy time during the whole of the journey, for, having a little leisure from professional work, he hastened to Oaxaca to inspect the wonderful remains of the ancient Mexican buildings in that neighbourhood.

This was a period of absorbing interest to him, and in the two following letters he briefly describes the journey and the impression that these wonderful monuments of a bygone civilization left upon his mind. On his return to England he gave his friends long and detailed accounts of the scenes visited.

THE BRITISH CLUB,
MEXICO CITY,
9th Sept.

. . . I have seen the great Mitla remains—a perfectly wonderful sight. I had a most interesting and delightful trip and passed through lovely scenery. I wish you had been with me! I got back here to-day. I will write to you to-morrow, but now send just this line about the ruins in case my letter should be late for the boat. The architecture is wonderfully distinctive, the decorative designs being perfectly unique and unlike what I have seen in any part of the world where I have been, the buildings being singularly striking and impressive.

THE BRITISH CLUB,
MEXICO CITY,
10th Sept., 1908.

. . . I have hardly stopped moving about for over a week, and had seldom more than a moment to write and send you a few lines.

I left Puebla in the afternoon for a watering-place called Techuacan and arrived there after dark. . . . I put up at an hotel where there were about a hundred people, of whom half were Americans and the remainder Germans and Mexicans. The water is supposed to have medicinal properties. The climate is perfect, cool at night and pleasantly warm in the day-time. . . .

After leaving Techuacan we passed through ordinary scenery between hills that converged, and by 12 o'clock the land began

Photo by H. Forbes Julian

CATHEDRAL, OAXACA

Photo by H. Forbes Julian

SAN DOMINGO CHURCH, OAXACA, MEXICO

to slope downwards. We soon got into a gorge between hills that towered six thousand feet above us, and by 2 o'clock had descended over one mile. Here we were amidst lovely tropical vegetation—palms, cactus, bananas, and hundreds of varieties of beautiful flowering plants. This continued for four hours, when we again rose to the elevated land where Oaxaca is situated. . . . The railway is narrow-gauge and is owned by an English company; it winds its way in a most zigzag fashion along the banks of the rapid stream.

We arrived at Oaxaca in the dark; it is a charming old city containing some very fine churches and other interesting buildings. Santo Domingo Church has a most gorgeously decorated interior. The cathedral has an imposing exterior, and I took several photographs. . . . There is also another remarkably fine old church. . . . In a niche over the door of one of these old churches is a statue of the saint holding a gridiron. . . .

The market is a most picturesque sight; it was Saturday morning when I was there, and it was filled with a motley crowd of Indians. The people in this part of Mexico look exceptionally happy and well fed, but they do not suffer from a superabundance of clothing.

I arranged as soon as possible for a vehicle to take me to Mitla, some thirty miles by road, where the ruins are to be seen. A carriage met me driven by a boy of about twelve, a bright intelligent little fellow who drove with the confidence of a man of forty, and it took five and a half hours to reach Mitla.

I got into a comfortable hotel, the meals being served out of doors under the shade of orange-, lemon-, and banana-trees. It was truly a lovely spot. My waiter was even younger than the driver, and probably only about ten years old!

I spent some hours in the afternoon going over the marvellous Mitla remains and taking photographs. Portions of the ruins are in a wonderful state of preservation and look as if the stones might have been set only a few years ago. The ornamental designs are geometrical, of quite distinctive character, and very finely and beautifully cut. It is all intensely interesting. There is an underground passage that is in as good a state as when it was built—a perfectly wonderful and remarkable spectacle. The buildings show from their striking and strangely specialized style of architecture that there must have

existed a highly advanced state of civilization, but how long ago one can have but a dim idea.

There are even finer ruins to be seen in the neighbouring State of Yucatan. I paid a second visit to the ruins in the morning and took some more photographs. My visit proved of exceptional interest, but I was all the while longing for more time. It was too much of a rush, as one did not get sufficient time to realize the marvellous character of all that one saw. . . .

I am now a member of the British Club, and met some of the members yesterday, and we had several talks of home. . . .

Unfortunately, some long letters giving further descriptions of the marvellous remains of ancient Mexico at Mitla and elsewhere are missing. Although his knowledge of prehistoric archæology was not extensive, the examination of the ruins stirred him to unwonted enthusiasm. During his brief visits in September he devoted all the time available to their survey, taking photographs and getting drawings and plans in the few days that could be spared from professional engagements.

Concerning the geometrical character of the design referred to, it may be interesting to quote a passage from the Presidential Address delivered in 1912 by Dr. Maudslay at the Royal Anthropological Institute. This eminent authority on Mexican art says: "To me the decoration of Mitla appears to be a translation of textile and basket work into stone, influenced of course by the motives that are most prevalent in all American art."

At the end of September the traveller visited El Paso, on the American border, and in the following letter mentions some of his impressions of the pageant which he witnessed on the Mexican Day of Independence before his departure. The promptitude with which he left the country after his final interview with the Mexican Director of Patents gives a characteristic

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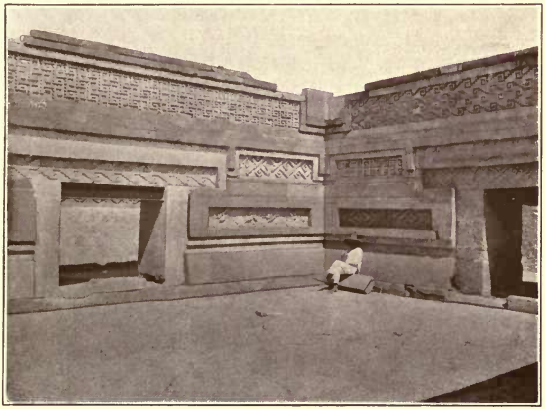

Photo by Dr. Maudslay

RUINS OF MITLA

(By kind permission of the Royal Anthropological Institute)

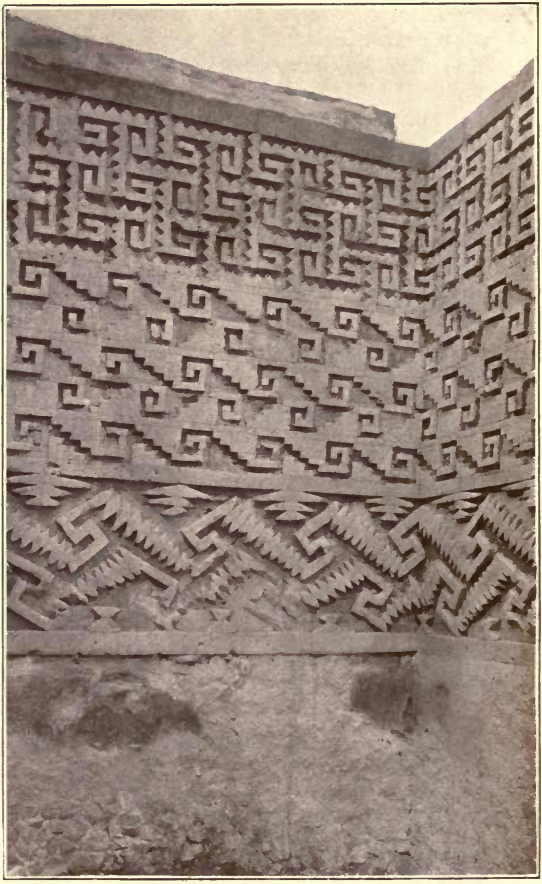

Photo by Dr. Maudslay

RUINS OF MITLA

(By kind permission of Royal Anthropological Institute)

glimpse of the celerity of his movements when travelling. Allusion is also made to the festivities on the President's birthday, almost the last before the revolution. Diaz ruled the country with the heavy hand of a master, but he developed its resources by encouraging foreign enterprise. He was an eminently practical man, whilst the patriotic Madero was a dreamer, thinking only of "Mexico for the Mexicans."

St. Regis Hotel,
El Paso, Texas,
21st Sept., 1908.

. . . I am now in the United States *en route* for San Francisco. On my way I am going to call at Prietas, which is a little way over the Mexican border. . . .

There were several public holidays coming on when I arrived from Oaxaca, and therefore I had not much chance of an interview with the officials. Instead I paid a hurried visit to El Oro, where there are several large mines which I wanted to see. It was eight hours' journey to El Oro, which is situated at an elevation of ten thousand feet. The people at the mines all know me by repute, and were very kind in showing me about. The town contains nothing of interest, but the mines are amongst the finest in Mexico. They are owned by English and French companies. The route to El Oro is through beautiful mountain scenery, the vegetation being now at its best. The flowers were charming and the colouring indescribable. There are great fields full of single-coloured wild flowers—pink, yellow, blue, purple, and white—many of which I recognized as garden varieties at home. . . . I got back to Mexico City on the President's birthday, but after dark and too late for the ceremony. I was, however, in time for the illuminations and fireworks and the sight of young Mexico celebrating the occasion. . . .

On the following day, the 16th of September—Mexican Independence Day—there was a great military and naval pageant. I had a seat in an excellent position and saw everything capitally.

The Mexican soldier, whether on horseback or on foot, is not smart-looking. His uniform is cumbrous and gives

him the appearance of being clumsy. At the end of the procession, however, came a regiment of rough-riders, who are as smart a set of men as one could see anywhere. Their uniforms were made of soft leather cut in Mexican fashion, and they wore large Mexican hats. They sat on their horses as if they were part of the animal. I am told that this regiment was formed of the roughest and most unmanageable element of the countryside rebels, thieves and highwaymen, but since they had uniforms and were given the policing of the most unruly districts, they have become useful members of the army.

In the evening the whole town was again illuminated, but the energy of the people to a large extent had been spent the evening before and they did not show the same enthusiasm.

On the following day I visited the Director of Patents for the last time. . . . As there was nothing else to keep me in Mexico, I left the same day. I have arranged to return via San Francisco, so that I could explain to Mr. Butters and Mr. Crosby exactly the position of affairs. . . . I arrived here last night, and expect to leave again to-morrow. This is a typical American town where everything is up to date. It is a tremendous contrast to the towns over the border.

The traveller returned to Mexico for a brief visit to the mining district of Prietas early in October. He had spent about three months in the country, and it had been a time of long journeys, much mental and physical exertion, and of varied interesting experiences. The expedition had been entirely successful both from a scientific and a professional point of view, and had also been fruitful in fresh antiquarian observations. He always looked back upon his visit to the wonderful and unique archæological remains of ancient Mexico as one of those events in his life of which the memory could never fade away.

After staying for a short time in Texas and New Mexico, he visited Tucson in Arizona for a few days, breaking the journey there on his way to the Pacific coast.

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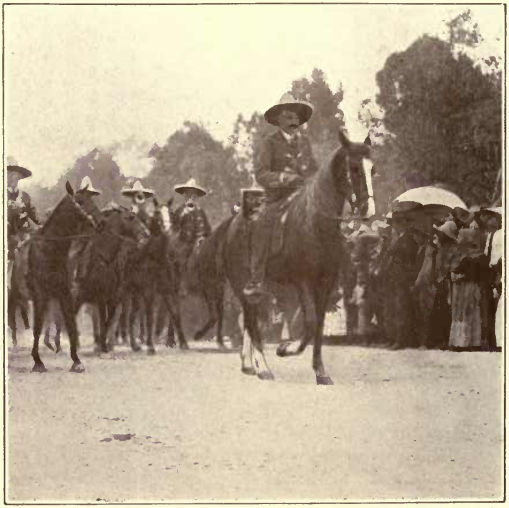
MEXICAN MUSICIANS ON THE TRAIN



Photos by H. Forbes Julian

MEXICAN ROUGH-RIDERS

CHAPTER XIV

CALIFORNIA

PROCEEDING westward to California, which he had not visited for fifteen years, Forbes Julian stayed for a short time at Los Angeles and Pasadena, where he was delighted with the sunlit skies, the beauty of the scenery, and the luxuriant subtropical trees and plants.

In the following letters to his wife he alludes to his various engagements. These letters from the United States were hastily written in the intervals of travelling and professional work, but they give an outline of his labours at the time, so that through them he is enabled to relate the experiences himself. Naturally many passages are passed over that were written for his wife alone, but in all his correspondence not one harsh or thoughtless word concerning others has been found which might have necessitated omission, the letters and their outlook being invariably kindly and imparting an intimate touch, revealing his character. Those written from Mexico have been quoted with a fullness of detail that might appeal to his mining friends; the rest of the correspondence is selected briefly for general readers. This is an inevitable difficulty in presenting a full life's work from the special to the general outlook. For friends it should be full; for the public at large restrained; and the task of a biographer is to discriminate between the two extremes.

Writing in October 1908 from Los Angeles, he says:

. . . I left Tucson in a Pullman sleeper and had a fairly pleasant trip, although it was rather warm. We passed through a place that is said to be one of the warmest localities on earth ; it is 270 feet below sea-level. This was, however, in the night, and I did not notice anything oppressive. In the morning everything was covered with alkali-dust. After getting through the desert we passed hundreds of miles of orange-groves, where everything looked highly prosperous. I arrived here yesterday and saw a good deal of the town in the afternoon. This morning I called on Mr. Blaisdell, an engineer, and he invited me on a motor tour. . . . We drove all through Pasadena, which is a lovely place. It is the best residential part and is beautifully laid out with subtropical trees and plants. The palms are magnificent. I have seen a good deal of the town, which contains some fine streets and the best shops I have met with in America. The climate is very pleasant ; the people were calling it hot, but it was no warmer than an ordinary summer day in Torquay, and the evenings are cool.

I leave to-morrow morning for San Francisco.

In San Francisco friends in plenty were awaiting him, and he was received with cordial hospitality by Mr. Rickard, Mr. Crosby, and other mining men. This, however, could not compensate for the great disappointment of missing his English mail, and the following letter is worth quoting as it incidentally shows the writer's love of home.

HOTEL ST. FRANCIS,
SAN FRANCISCO,
13th Oct., 1908.

. . . I left Los Angeles on Sunday morning ; the line runs quite close to the coast for about three hundred miles, and it did my eyes good to see the beautiful ocean again.

The sea was calm, but there was a heavy swell which produced magnificent breakers. We had brilliant sunshine, and the colouring on the waters, which varied from a bright pale green to a deep purple, was perfectly exquisite. . . . We arrived here at midnight, and the next morning I hurried off to the office, when they told me that all my letters had been forwarded to New York. . . . It has spoiled all my pleasure

here, for it makes me feel very anxious when I am without news from you. . . .

Not having been in San Francisco since the earthquake and the fire, which swept away street after street of magnificent buildings, Forbes Julian was greatly distressed to see the evidences on all sides of the dreadful desolation and ruin that had been wrought, and he briefly alludes to the effect of the rebuilding of the city in the next letter.

HOTEL ST. FRANCIS,
SAN FRANCISCO,
16th Oct., 1908.

The sun shines again and I am quite happy, for two of the letters you sent to New York were forwarded here. One was written from Russell's Hotel, Dublin, and the other from the Giant's Causeway Hotel. I was delighted to get them. . . .

San Francisco is being rebuilt very rapidly, but the effect of the earthquake and the fire is still apparent in places in the heaped-up ruins showing the extent of the disaster. . . . It is an absolutely new town. . . . Although there is nothing pretty or attractive in the appearance, there is a pleasing freshness in every building one enters. This hotel is an excellent one and is beautifully furnished. . . .

I have been put up as a member of the Pacific Union Club, which is the Millionaires' Club, and have also been offered the privileges of a member of the Bohemian Club, which is more interesting, being the club of Talent. I have been kept busy by callers, and have been invited out to lunch every day. This morning I met Mr. T. A. Rickard, a Cornishman from Belfast, who is greatly appreciated in the mining world. . . .

It was a great enjoyment to visit many of the old haunts that had been familiar to him on his previous visit, and especially Cliff and that exquisite part of the bay named the Golden Gate, where such a beautiful scene greets the eye. From this vantage-ground the views of the sparkling sea, flooded with sunshine, are full of variety and charm.

HOTEL ST. FRANCIS,
SAN FRANCISCO,
22nd Oct., 1908.

I have been sight-seeing, but cannot enjoy it all alone without you. . . . I have been twice to Cliff, a lovely spot on the coast (about three-quarters of an hour by electric tram) where the famous seal rocks are to be seen. During my first visit the wind was strong and there were no seals, but the second time several made their appearance. When I was here fifteen years ago there were hundreds of seals on the rocks, but I am told that many have now, unfortunately, disappeared. . . . Several miles of the route to Cliff are along that beautiful part of the bay known as Golden Gate. . . .

On Monday I went to lunch with Mr. T. A. Rickard, who is editor of the *Mining and Scientific Press*, and met an engineer, Mr. Bosqui. Mr. Rickard is very good company and told us some excellent stories. . . . Every day I meet mining men who invite me out to their places, but I am so closely occupied that I have to decline. . . . The weather is as variable here as at home.

It is one day pleasantly warm and the next day cold.

Whilst in San Francisco he received the satisfactory news from Mexico that their case had been successful; but he was detained longer in California than had been expected, for although Mr. Butters, who had been absent, soon returned, his brother-in-law, Mr. Crosby, was extremely unwell; so at this juncture Forbes Julian offered to help with the pressure of their professional work.

HOTEL ST. FRANCIS,
SAN FRANCISCO,
27th Oct., 1908.

At present I am occupied at the office answering Mr. Crosby's correspondence, as he is too ill to attend to business. He had another relapse of heart trouble about a week ago, and the doctors think his case serious. I was very sorry to find him prostrate when I called to see him on Saturday. He is a thoroughly nice fellow. . . .

I went to Mr. Butters' house on Sunday and stayed the

night. We have had several beautifully warm days, and it was delightful crossing the bay to Berkeley, where he lives.

We have just received a cable to inform us that we have succeeded in our case in Mexico, so that my mission there has been successful. We are doing very well in our case in New Jersey. Mr. Binney has managed without me, but at the next hearing he says I must be there to help him in technical matters. . . .

He was daily expecting a summons to New York, and hoping afterwards to be able to return to England.

In addition to the time spent with Mr. Butters, he paid many visits to Mr. Crosby in his illness, endeavouring to cheer the invalid's sad and lonely hours.

The next letter describes the publication of the results becoming known of the election of President Taft; and an account is given of an expedition to Mount Tamalpais.

HOTEL ST. FRANCIS,
SAN FRANCISCO,
8th Nov., 1908.

The Presidential election was a very tame and unexciting affair here. During the day no one would have realized that there was an election going on. In the evening there were some crowds round the newspaper offices. The results, as they became known, were shown by lanterns on screens, and in the intervals between there were cinematograph illustrations, but there was no display of enthusiasm. I sat in the hall of this hotel looking at the results. . . . Then I went to the Millionaires' Club and spent the evening reading the *Spectator*, *Saturday Review*, and other home papers.

. . . . .

To-day I went with two friends to the top of Mount Tamalpais. It is half an hour by steamer to a pretty place called Sausalito. Here we got a train that took us to the top of the hill in about two hours, by a most extraordinary and winding line. The scenery on the way is very beautiful and varied. We started in cold damp mist that lay all over the bay, but the train soon emerged into most glorious sunshine, and on the top of the hill it was just like midsummer. On the one

side we looked down 2500 feet on to the Golden Gate, and through a slight haze we could see the islands and the ships on the ocean. On the other side was a vast expanse of white mist that looked like billows of snow. How delightful it would be if you were here ! . . .

The vicissitudes of travel in the Far West are exemplified by the following reference to the trans-continental journey of some Scotch friends :

. . . Last night I went to see Mr. and Mrs. Johnston. They came a circuitous route, as he had to see some machinery in an out-of-the-way place on the journey, so they were eleven days crossing, of which seven of the nights were spent in the train. For two days they could not get proper meals, as there were no dining-cars on the train. Over a portion of the way they were obliged to take tourist sleepers, which broke down two or three times and made the train twenty-one hours late. Mrs. Johnston declares she had to undress and dress three times in one night through having to change cars. . . .

It was not until the middle of November that he was able to leave California. Proceeding to Chicago, he had the unpleasant experience of a breakdown of twelve hours in a Nevada desert. This he took with the customary composure of an old traveller. Few things disturbed his equanimity on a journey, excepting the failure to receive home letters.

In Illinois the weather was so cloudy that he could not enjoy the view of the lake, which he had seen with so much pleasure on former visits ; but he had the satisfaction of meeting some of his German mining friends of the old Frankfort days during his short stay. Writing from Chicago on November 24th, he says : " I have almost concluded my business here and expect to leave to-morrow for New York, and I hope to finish there also in a short time now, and will then be speeding off again to dear old England."

The end of the month found him back in New York in time for the public holiday and harvest festival on Thanksgiving Day. He records the fact that the weather was damp and gloomy, while such a dense fog occurred as seriously to interfere with the shipping and delay the start of the *Lusitania* of the Cunard Line and other fast Transatlantic steamers.

By great good fortune he was not detained long in New York, and arranged to sail early in December. Reaching Liverpool on the 13th, he was able to arrive at Torquay on the following day in time to spend Christmas with his wife at " Redholme."

CHAPTER XV

NEW YORK AND NEW JERSEY

THE year 1909 opened brightly for Forbes Julian inasmuch as he was happily settled at home once again amongst a pleasant social circle after his long absence abroad, and on New Year's Day itself a large number of friends gathered at "Redholme" to welcome him back.

Frequently summoned to London by reason of increasing pressure of work during these opening weeks of the year, he yet returned to Torquay whenever possible.

Amongst other friends staying there this winter were Bishop Boyd Carpenter, General Sir Peter Lumsden, Dr. Vaughan Cornish, the traveller and scientist (who had recently returned from Panama), and Colonel John Weir, a Scotsman who had been much in America. In view of what was later destined to occur, it is strange to note that on one occasion while the Colonel was taking tea at "Redholme," Lady Alice Leslie also being present, the conversation between Colonel Weir and Forbes Julian turned chiefly on voyages across the Atlantic.

Three years later both the Colonel and Forbes Julian perished on the *Titanic*, while two of Lady Alice Leslie's nieces, the Countess of Rothes and Miss Gladys Cherry, were also on the doomed vessel, but were mercifully saved in the boats. Whilst discussing the perils of the deep, the curious coincidence was recalled that Mr. Forbes, the great-grandfather of the

subject of this memoir, had been drowned not far from his Aberdeenshire home after having travelled round the world and taken various long voyages. Likewise Mr. Pengelly, the great-grandfather of the present writer, the captain of a vessel, had also perished by drowning on the Cornish coast, almost within sight of the land and of his home.

On reaching London early in January Forbes Julian met several colleagues, and wrote home on the evening of his arrival: "I arrived in time for the Board meeting, at which I gave my Report, and left them all in good humour. I had a long talk with Humphreys, who was interested in the news. . . . "

In town he also met his German friend Herr Crohn, from Berlin, and Mr. Anderberg, the Swedish Vice-Consul.

A week later he received a cable from Mr. Binney stating that his presence would be needed in America shortly for the Butters lawsuit.

Writing to his wife on January 21st, he says:

> I am getting on with my work, so that I expect to be with you at Torquay on Friday. I will try to get everything ready to leave England at a day's notice, in case of need. . . . I have met several friends—Pollard Digby, Crohn, Anderberg, and others.

Concerning these hurried voyages Herr Crohn wrote somewhat later: "Mr. Julian was like a soldier, always ready to start off on professional work at a few hours' notice."

Although he faced light-heartedly enough the prospect of another journey and voyage in "winter and rough weather," this summons to cross the Atlantic again so soon was most unwelcome. Before his marriage he had greatly enjoyed travelling at all times; now he was unhappy alone, but consented

to go when needed on technical matters—for he was, above all, faithful to the profession he had chosen.

Fortunately, it was found that he need not leave until the following month, and on February 16th he started for Southampton, his wife accompanying him on the first stage of the railway journey.

That summer the British Association was to meet at Winnipeg and he was to read a paper before the Engineering Section. He was therefore looking forward to returning to England and starting again with the members for Quebec at the beginning of August. He was, however, detained in New York until July, so his wife went out in that month to join him for their Canadian tour.

Reaching New York at the end of February, he was closely engaged with professional work during the spring, as shown by extracts from the correspondence with his wife, in which he mentions many of the details of his interviews with Mr. Binney and Dr. Chandler and describes his daily life in the city. In the first letter quoted he alludes to the festivities on St. Patrick's Day.

The letters are all written from the Murray Hill Hotel, and bear the following dates :

18th March, 1909.

. . . It was a great day was the seventeenth—a day that would have filled St. Patrick himself with enthusiasm had he been in Fifth Avenue to witness a procession of seventy-five thousand men and hundreds of thousands of sightseers. It was a regular gala-day for Pat. The police, being all Irish and masters of the situation, cleared Fifth Avenue of the millionaires and gave it over entirely to their countrymen. At St. Patrick's Cathedral there was a grand service. Every Irish society had its band and played the most stirring Irish airs. The sightseers wore some sort of green emblem, and I

am enclosing you my little trefoil that I bought for one cent. The Irish chambermaid at the hotel was in tears at having to leave her friends in the middle of all their festivities. . . .

I have sent you a New York evening paper with an account of the Irishmen.

A lover of animals, his broad sympathies were always exerted to better their condition or mitigate their sufferings. He enjoyed making frequent visits to the Zoological Gardens when in New York, and in the next letter describes one of these expeditions to the Bronx Park.

30th March, 1909.

Sunday was a brilliant spring-like day, and in the afternoon I went off to Bronx Park. I took the third Elevated railway to the Botanical Park Station, just opposite the greenhouses, and had a pleasant walk through the shrubbery to the part where the animals live. There have been some changes in the Gardens since you were there. The elephant-house is now finished and tenanted. It is a splendid house for the purpose and is highly ornate. There are three large elephants and two small ones, one of the latter being quite a baby. There are two tapirs like the ones we saw and a baby only a few months old. There is also another variety of tapir (Malayan), a fine hippopotamus, and several other animals in the house. . . . I spent an interesting hour with the birds and then wandered over the grounds. . . .

By the beginning of April some progress had been made with regard to the taking of testimony, and he describes this in writing home, and mentions a fact which shows that his volume on cyaniding was much appreciated in America. Although very modest about his work, he was naturally gratified by the kind manner in which his colleague Dr. Chandler brought the matter to his notice. He cared little for personal renown, but valued very highly the warm regard of his friends.

2nd April, 1909.

It is six weeks to-day since I arrived here, and it does seem such a long time. . . .

Yesterday (Thursday) was a busy day, for it was the first taking of testimony, and I must tell you how it is done.

We met at Mr. Binney's office, which (for the time being) becomes the court—that is, during the taking of testimony of witnesses on our side. When taking testimony of witnesses on the other side we all meet at the opposing attorney's office.

In this case Dr. Chandler was "on the stand," and there were also present the two attorneys, a plaintiff's representative, and myself. An examiner is supposed to preside, but if the two sides are agreed they can proceed without him. This time no examiner was present. Everything is arranged beforehand between his attorney and his witness as to the questions that will be asked, and the answers are discussed for days and weeks prior to the witness being put "on the stand." The attorney then asks a formal question, which is taken down by a typist, and the witness dictates to the typist his answers. The witness is allowed any books, papers, or notes, and is also allowed to revise his answer afterwards if he thinks fit. The testimony is typed in triplicate, one copy being for the court and one for each of the attorneys. Of course, in the cross-examination (when that comes) there is no preparation between the witness and the opposing attorney, but the witness is allowed papers, books, &c., to consult as he may wish, and is allowed plenty of time to arrange his answer.

When all the testimonies are taken on the two sides the evidence is put before the judges, who decide from the evidence placed before them whether the plaintiff has a case or not.

These preliminary proceedings are very informal, as you may imagine. The witness is given every opportunity to make the best answer he can, and is allowed as much time as he likes. The next hearing is to be on Tuesday, when Dr. Chandler proceeds with his testimony. He may require five or six days, and after that I am to go on the stand, but I think it will not take more than two days for all I have to say. To-day I went to Binney's, where (with Dr. Chandler) we prepared more testimony.

Dr. Chandler asked me to-day to tell you that he asked the metallurgical man on the telephone if he had any books

on the cyanide process. The reply was that he had about half a dozen, but one of them was much better than all the others. "Well, send me that one," said Chandler, and when it arrived it turned out to be Julian and Smart's work. . . .

A visit made with Dr. Chandler and the assistant, Mr. Cressey, to the Columbia University afforded him much pleasure; he was always interested in inspecting a laboratory and eager to hear the details of any fresh discovery from the discoverer himself, realizing clearly the necessity of visiting and comparing in different countries the methods in use amongst chemists and mining men.

6th April, 1909.

On Saturday morning Dr. Chandler rang me up and asked me to meet him at the Grand Subway Station, as he wanted me to see the Columbia University.

We arrived there at 10.15, and after going over his laboratories he took me to see his museum. It is a collection of everything manufactured in various parts of the world which involves a knowledge of chemistry in any one of its branches.

It is intensely interesting, and a perfectly wonderful collection for any man to have got together. . . . After that I went over the buildings with his assistant, Mr. Cressey, a delightful young fellow who had been last summer for a tour to see the European universities. It was Saturday afternoon, and most of the men were away, but I was introduced to two of the professors in the School of Mines. . . .

On Sunday after lunch I crossed over to Brooklyn by ferry and walked back via the new bridge that was opened last week for foot passengers and vehicles. It is a fine structure and of great length.

* * * * *

I was particularly interested to hear of your pleasant visit from the Bishop of Ripon and Mrs. Boyd Carpenter, and I hope you will enjoy going to Miss Boyd Carpenter's wedding-party at Kingswear.

On Easter Sunday he heard an eloquent sermon from an Irish clergyman, and during the week carried out

an experiment with Dr. Chandler at Columbia University, where he was glad to avail himself of the opportunity of meeting various well-known scientific investigators.

13th April, 1909.

On Saturday . . . in the evening I wandered as far as Broadway, and on passing the Criterion Theatre I saw announced there *An Englishman's Home*, and not having seen one for a long time, I strolled in. The piece was fairly well acted, but it seems to be hardly suited to a New York audience. The house was well filled and I think a large proportion of the audience were British. Four young fellows sitting near me were all British, and one told me he came from a village in Essex near where the scene is laid.

Easter Sunday was a brilliant day with a crisp, frosty feeling in the air. The churches were crowded and the streets thronged with people. I went to a church in Fifth Avenue, where the clergyman gave an excellent sermon. He was unmistakably an Irishman. The building was very prettily decorated.

Yesterday I joined Binney at Dr. Chandler's house, with whom we stayed for dinner, and did not get away until after 10 o'clock. To-day Dr. Chandler spent from 11 till 5.30 "testifying." He says this is one of the most complicated cases with which he has had to deal. It is probable I may be giving expert testimony next week. . . .

On Wednesday I went to Columbia University, and Dr. Chandler and I carried out an experiment in connection with our case.

He has to "testify" to the result. I was introduced to several of the most eminent professors.

. . . . . .

On another legal matter in connection with the Butters Filter Company Binney suggested consulting Griggs (Colonel Weir's friend), and we went over together. Griggs used to be the Attorney-General of the United States, and he strikes one as a very able man and full of interest. . . .

Whilst in New York he kept his forty-eighth birthday. In the next letter he alludes to this and also

to the Engineers' Club, where he frequently met mining friends and acquaintance.

7th May, 1909.

I shall be forty-eight next Sunday, nearly half a century! I told Binney my age was forty-seven, but when I am put on the stand I shall have to say that owing to the length of the case I must alter my age, and that I hope I shall not have to alter it again before the case is finished! . . .

On Friday I went to lunch with Mr. Schneider at the Engineers' Club. He is an interesting man and I had a delightful conversation with him. . . .

Yesterday I stayed at the hotel writing, but on hearing over the telephone that there was a letter at the office, I rushed down town by the subway express. When I saw from it that you were well after the influenza and going out it made me feel all right again. I was delighted to hear of your being appointed as the first lady to serve on the Committee of the Natural History Society and their delegate also to the British Association.

I think as the time comes near for the British Association some of the geologists and metallurgists will want to go to Cobalt. I understand that it is a wonderful formation. I have just had a letter on business from the King Edward Silver Mines at Cobalt, and I am known there by name.

. . . . . .

I wish I were with you having tea in our garden. The weather ought to be lovely in Torquay now. Here it is quite cool, but the young green on the trees looks beautiful. . . .

This month, which he was accustomed to pass with his wife among scientific associates in London, seemed somewhat desolate to the traveller when spent alone in a New York hotel, although the kindness of American friends was much appreciated and always gratefully acknowledged.

His interest in the daily occurrences of life at home remained as keen as though he were present, and he was relieved to know that the generosity of a Torquay friend, Sir Thomas Bazley, had rescued a picturesque

corner of Devonshire from those utilitarians whose chief desire seems to be that of destroying whatever beauty they can reach.

The early years of the century were remarkable for the rapid progress made in the solution of scientific problems, and he was anxious to keep in touch with the work of some of the learned societies of London, for, although devoting himself assiduously to his favourite study, he had a wide and varied interest in other branches of science. His wife sent him reports of the different meetings, and also described the gathering to which they had been invited at the Albert Hall, where the Prince of Wales presented medals on behalf of the Royal Geographical Society to Lieutenant Shackleton and his brave comrades of the South Polar Expedition.

18*th May*, 1909.

I expect there will now be quite an exodus from Torquay for London. It looks strange here to go up Fifth Avenue and some of the other residential parts and find half the houses with shutters up when the season in London is at its height. Within the last two weeks there has been quite a diminution in the number of carriages and motor-cars in Central Park and Fifth Avenue. . . .

I am glad to hear the Ilsham valley has been wrested by Sir Thomas Bazley from the hands of the builders. I always think that is the most charming part of Torquay. We have had some lovely walks together down the valley. . . .

I hope you will go to all the usual meetings while in London and will write and tell me about them, and particularly the scientific societies and the reception for Shackleton. I see from the papers that London is especially full this season. . . .

Yesterday morning I went to the office and put in five or six hours' writing, and then wandered through Central Park. I cannot describe to you how beautiful the park is looking, with thousands of trees and shrubs in blossom, which make a perfectly fairy scene. The little lake has round its

edge a number of drooping trees laden with wistaria in full bloom, producing a charming effect.

Closely occupied during June, it was not until late in the month that he could obtain the rest and change needed from the exhausting heat and airlessness of New York by going to reside at Atlantic Highlands, from which place he could conveniently visit the city. After settling, he describes his new surroundings and the charm that this beautifully wooded and attractive seaside-country district of New Jersey exercised over him.

ATLANTIC HIGHLANDS,
NEW JERSEY,
June 1909.

We have had a week of very hot weather with several bad thunderstorms. The temperature was over 90° on Saturday as I went to the office. I stayed there only a little while and then took a steamer for Sandy Hook. It was delightfully cool and fresh on the water. I went to "Atlantic Highlands," one of the nicest spots I have seen near New York. It is purely residential and is surrounded with beautifully wooded country. I engaged a room at a house on the highest part of the land, where one gets perpetual sea-breezes. There are only about half a dozen people here as yet, and they all seem very agreeable. I removed here on Sunday, and yesterday morning when I woke up and heard the birds singing I felt as if I were back in dear old Torquay. . . . The sea trip of two hours a day is a great attraction, and the wonder is that everybody does not want to live at Atlantic Highlands in the summer instead of in New York. The house is beautifully situated, and I think you would like being here for a while. I have been making inquiries about going North, and find that there are good steamers as far as Albany, up the Hudson, from which point we could go in any direction for Canada. It may be hot travelling in the trains in July and August; the heat generally comes in waves that last three or four days. . . .

In the following letter, written in July, he describes some boating expeditions made with Mr. Greig, a

Scotsman with whom he soon became intimate and who showed him much kindness. Becoming acquainted also with several of the visitors as the hotel filled, he was soon able to fraternize with the new-comers. He also expresses his pleasure at the prospect of again meeting his wife.

ATLANTIC HIGHLANDS,
NEW JERSEY.

The *Baltic* is (I believe) a splendid ship. If she makes a good voyage she ought to get you here by noon on the Saturday. . . . It has been very warm the last two days, and as there was not much to do at the office I gladly stayed at Atlantic Highlands. It is much pleasanter living here than in New York; in fact, any of the outside places are preferable to New York hotel life. . . .

Mr. Greig (to whom the boat belongs) is very glad to have a companion, and he and I had six hours' sailing together on Saturday. We spent Sunday morning sailing about in the bay very slowly, as there was only a light breeze. In the afternoon a strong breeze sprang up, and we had a fine sail. In the evening a thunderstorm cooled the air. On Monday I went to New York and spent most of the day at the office. To-day I was again at the office, and while I was writing Mr. Garthwaite (Mr. Butters' partner) turned up from London. . . .

I am looking forward to your arrival and to our Canadian trip with delight. There is a great deal to be seen in the short time at our disposal. . . .

His wife had remained in London until July to enable her to go down to Eastbourne for the wedding of his cousin Lieutenant Eric Neligan with Lelia, daughter of Colonel Sir Charles and Lady Alice Fitzgerald, where she met a large number of his Irish relatives. The bride was Irish both on her father's side and on that of her mother, who had also been a Fitzgerald before marriage, being a daughter of the fourth Duke of Leinster. Nothing could exceed the kindly hospitality of Sir Charles and Lady Alice, and

it was greatly regretted by his numerous connections that Forbes Julian could not be present.

Sailing immediately afterwards on the S.S. *Baltic*, his wife enjoyed the companionship of Professor and Mrs. Myres, of Oxford, who also were bound for the British Association meeting at Winnipeg, the professor being president of the Anthropological Section this year.

Forbes Julian met the vessel, and his wife had the opportunity of seeing his friend Mr. Greig, who spoke warmly of his pleasure in her husband's society on the boating trips and mentioned how useful his knowledge (acquired from the old sailor Tipper at Shaldon) had proved on various occasions.

CHAPTER XVI

CANADIAN TOUR FROM QUEBEC TO VANCOUVER

(Compiled from Mrs. Forbes Julian's Journals)

GLADLY leaving the heat of New York behind, the travellers turned northwards to Montreal, staying there, however, but a few days, *en route* for Quebec. Reaching this beautiful city, set on a hill, with its rocky foundations, they drove up the narrow winding streets to the Hôtel Château Frontenac, which occupies a site unequalled for fine and extensive views. They passed the twilight of the summer evening on the famous Dufferin Terrace. Far below was seen the St. Lawrence River flowing towards the east, and in the harbour every kind of craft, from the great ocean liner to the tiniest canoe; whilst the lights of Levis began to glimmer in the gathering darkness. Coming from the largest city of the New World, the home of business and commercial enterprise, the quaint Canadian capital with its halo of romance, stirring the pulse with memories of past days, afforded a remarkable contrast and spoke at every turn of the heroism of one of Britain's greatest sons.

The city has little that is English about it, for although several generations have now been living prosperously under the British flag, yet the language and religion of old France remain almost unchanged. The street scenes somewhat reminded the visitors of those in the old towns of Normandy and Brittany, the French Canadians, although contented members

of the British Empire, having the deepest devotion to their mother-tongue and the Catholic Church. It will be remembered that Jacques Cartier was the first European who sailed into the St. Lawrence, and that he spent the winter of 1535 at the base of the cliffs of Quebec; whilst the French fur-trading companies soon afterwards made it their headquarters, and in the following century it became a French stronghold. Naturally the greatest attraction to British visitors must be a visit to the historic Plains of Abraham with all the memories of strenuous strife—the death of Wolfe in the hour of victory and of his great antagonist, Montcalm, who died of his wounds at an adjacent convent a couple of days after the fatal field of September 1759. The importance of this victory can hardly be over-estimated; it was indeed the pivot of the war, for on September 18th Quebec capitulated, and in the following year (1760) Vaudreuil, the last French governor, signed a document surrendering Canada to Britain. Wolfe's success, by which Canada was incorporated in the British Empire, made the loss of the thirteen American colonies less disastrous.

After these scenes (so eloquent of the undaunted courage both of the victor and the vanquished) had been thoroughly studied, visits were made to the historic Citadel, the Parliament Buildings, and the celebrated Basilica, begun during the reign of Louis XIV, when his influence extended to the New World, Quebec being the seat of the French power in America and the picturesque and prosperous capital of New France. Here the costly vestments were shown to the visitors and also many fine paintings, the most famous picture probably being that of our Saviour on the Cross, painted by Van Dyck. It is interesting to recall the fact that at the time of the French Revolution some Roman Catholic priests

secured several rare paintings and had them sent from Paris to Quebec, where many are still to be seen.

On Sunday, service was attended at the Anglican cathedral, and on other days visits were paid to places in the Lower Town, an entertaining scene being witnessed in the open market-place, where the farmers and their families display their simple goods, much French being spoken, which is the case in all the thoroughfares and business centres of the city.

An expedition was also made to Levis, on the opposite shore, this being a place of some historic associations. Looking back across the mighty St. Lawrence River, a fine view is obtained of the Citadel and the Dufferin Terrace, the spires of the churches in the city shining out clearly in the bright sunlight, The steep, narrow streets and quaint little houses of Levis give it quite an old-world character.

Other interesting expeditions within easy reach are the fine Montmorency Falls and that spot dear in the annals of the Canadian Catholic Church, the famous shrine of Sainte Anne de Beaupré.

Leaving Quebec with regret, the travellers passed through the pretty and prosperous town of Three Rivers, proceeding thence to Montreal for a second visit. This celebrated city, the largest in Canada and the greatest in commercial importance, is also famous historically, for as long ago as 1535 Jacques Cartier discovered here the ancient Indian village of Hochelaga, and somewhat later it was visited by Samuel de Champlain. In the contest for supremacy in the New World between England and France its story stands out conspicuously, as it was the last place which passed into English hands, being yielded up to Britain by the French in 1760. During a century and a half of peaceful progress the two nations have now continued flourishing in Canada side by side.

During their stay the travellers were taken to several places of interest by Professor Stanfield of the McGill University. The church of Notre Dame and the Anglican cathedral were visited, and service attended at the latter. The Law Courts and the Bank of Montreal were not forgotten, and the McGill University was thoroughly inspected.

The city has many fine buildings, and as they were staying at the Windsor Hotel in Dominion Square they were centrally situated, and were impressed by the prosperity of the cosmopolitan city as evidenced by the shipping, the manufacturing establishments, and warehouses. One of the chief attractions is the mountain park of Mount Royal, owing to the charming walks and the panorama thence obtained of beautiful views of the surrounding district and the St. Lawrence River.

The next halting-place was Ottawa, the Federal capital, which it was interesting to visit after staying in the ancient capital, Quebec, and the commercial capital, Montreal. The city is a creation of recent times, and is pleasantly situated at the junction of the Rideau River with the Ottawa. It is divided into the Upper and Lower Town, and stands on high ground overlooking a fertile valley. The morning after arrival was spent in viewing the Government buildings, which crown the great bluff overlooking the Ottawa River and are stately and imposing. Rideau Hall, the residence of the Governor-General, was also visited.

Another break in the journey westward was made at North Bay, situated on beautiful Lake Nipissing, where a few other members of the British Association, geologists and mining engineers, were already assembled, and on August 17th the party proceeded northward to Cobalt. This mining district affords one of the most remarkable stories in the history of recent Canadian

metallurgical progress. It was discovered accidentally in 1903, and is noted for the narrow rich veins of silver which are found traversing ancient quartzites and conglomerates that have been invaded by diabase. The Sudbury field (at some distance) is also of great commercial value, giving Canada control of the nickel market of the world.

An animated controversy has taken place as to the origin of the ores. Professor Coleman and some authorities consider them to be due to direct segregation from a molten rock, a norite gabbro; but other eminent professors, on the contrary, relying on the microscopic structure and sequence of the minerals, are of opinion that the ores must have been deposited long after the consolidation of the adjacent igneous rocks.

At Cobalt a group of earnest and successful mining men are engaged in careful investigations and experiments. Whilst staying there Forbes Julian and his wife were the guests of Mr. Rogers, and were among most congenial friends, meeting Mr. R. W. Leonard, of St. Catherine's, Ontario, and other Canadians eminent in the mining world.

The following description of the neighbourhood may be quoted :

> There are numerous small veins, probably averaging four inches in width, with very high values in silver, together with cobalt, nickel, and arsenic. . . . In prospecting, cobalt bloom, the delicate pink-coloured decomposition product of the cobalt-arsenides, is looked for. If traces of it are found, the rock surfaces, both those which are exposed and those which are soil-covered, are carefully examined. Much of the prospecting consists in digging trenches through the soil to the compact rock below. Nuggets of silver, freed from cobalt and nickel minerals by the weathering of the latter, also frequently give evidence of the presence of veins. At times if the veins are covered by drift material, the undecomposed

veins are found immediately below the soil and show glaciated surfaces. The veins throughout the six or eight square miles in which those rich in silver are found show no uniformity in strike, and in nearly all cases their dip is vertical. There are rocks of three ages in which productive veins have been found. Most of the veins occur in the Lower Huronian conglomerate and graywacke slate. A few are found in the older Keewatin and a few in the younger diabase.

Intent on making himself master of what had been done in Canada, it will be readily understood with what enthusiasm Forbes Julian studied on the spot the methods in use and discussed with Mr. Rogers, Mr. Leonard, and other acquaintances matters connected with his favourite study, thus gathering information concerning the equipment and operations of various mines and metallurgical establishments in the Dominion. The Cobalt silver veins brought about the same result that the auriferous placers of California, British Columbia, and Australia effected in earlier times. They attracted not only miners, but also other classes who came to the region and thus effected its settlement more rapidly than in regard to the slower but surer industries of lumbering and farming.

In addition to availing himself of the experience of the mining acquaintances met with, several visits were paid to the mineral fields, which were studied under their guidance, and no more admirable environment could be found to inspire a metallurgist. One great advantage and benefit as to science is its catholicity, a feeling of brotherhood seeming to exist between the workers in all parts of the world, so that a scientific man has friends everywhere.

Enjoyable drives and water excursions were also taken during the week, the fine Temagami Lake and surrounding forests making up a scene of sylvan beauty

of which the impression long remained. The effect of the water and forest has been thus described :

> Many-hued and soft-shadowed as the morning light plays on pine- and spruce-top, on waving birch and quivering poplar, on dark cedar and brilliant maple ; clear-cut and bright in the strong light of a Canadian midday ; rich in purple, crimson, and gold as the sun goes down ; vague, soft, and silvery in the moonlight ; mysterious and overwhelming when the sun has set behind the hills.

Continuing their journey across the continent, the travellers carried with them from Cobalt kindly recollections of their visit and of Canadian hospitality. The views obtained from Lake Superior more than repaid them for the fatigue of the journey. Most lakes have a charm which appeals to the lover of nature, but Lake Superior, the largest and noblest inland expanse of fresh water in the world, must impress even the least poetic mind.

Proceeding onwards from Fort William, the railway line traverses a wild and romantic region diversified by rapid rivers, large lakes, and fine forests. After leaving Keewatin a beautiful scene is afforded by the Lake of the Woods, which is studded with islands. As the line runs on and Manitoba is entered the country slopes gently down and melts into a plain, assuming gradually the characteristics of the rolling prairie. The Red River is crossed by a long iron bridge, and Winnipeg, the centre of manifold progressive activities, is finally reached.

During the gathering of the British Association the sections of Chemistry and Engineering met in the University of Manitoba, whilst that of Physical Science was accommodated at Wesley College. The meetings were in every way successful, and many citizens of Winnipeg, together with representatives of science from all parts of Canada, the United States, and Great Britain, assembled on August 25th to hear the Inaugural

Address of Sir Joseph Thomson. In this discourse the President touched on the importance of original research as a means of education, and dwelt on the advantages and disadvantages of the present school and university systems as a training for work in science; alluding also to the light thrown by recent investigations on the nature of electricity; on the relation between matter and ether; the part played by ether in modern physics; and discussing some problems raised by the discovery of radium.

The meetings at Section A, under the presidency of Professor Rutherford; of Section B, where Dr. Armstrong was chairman; and of Section G, at which Sir William White presided, were noteworthy and important, gaining a high place in the records of the yearly gatherings.

Forbes Julian was now a member of committee both of Section B (Chemistry) and of Section G (Engineering), in addition to serving on the General Committee of the Association. He had not only a keen interest in his own profession, but also a wide scientific outlook. The programme of the meeting was unusually full and attractive, evening lectures being delivered by Dr. Tutton on "The Seven Styles of Crystal Architecture" and by Professor Herdman on "Our Food from the Waters." Several receptions were also held during the week, and the Lieutenant-Governor received the members at Government House on Friday, 27th. On the Saturday the metallurgist and his wife went with other friends to a garden-party given at Silver Heights by Lord Strathcona, who had shown them much kindness on different occasions.

A quiet Sunday was spent in attending service at St. John's Cathedral. They had the pleasure also of the society of Dr. Du Moulin, Bishop of Niagara, a genial Irishman who had known many of Forbes

Julian's relatives at Cork. The Bishop was settled at the Royal Alexandra Hotel, where they were also staying. It was convenient to be so centrally located during this busy week, as many functions were arranged at the hotel, two taking place on Monday, 30th, when a luncheon party, given by Devonians in Winnipeg to Sir William White and Forbes Julian as the two special guests, was held there ; and also a reception of all the members in the evening.

On the following day Forbes Julian was prostrated by a sudden feverish chill and loss of voice. This prevented him reading his Paper at the Engineering Section, which was much regretted by the chairman, Sir William White, who considered it an important contribution, giving the solution of some of the problems at which the author had been working. Rallying with a couple of days' rest, he fortunately recovered sufficiently to start for Vancouver on the special train kindly provided for the official party.

Winnipeg commands the trade of a large region, being situated about midway between the Atlantic and Pacific Oceans, and it was not without regret that the travellers left this pleasant progressive place where they had experienced so much friendliness and hospitality. Starting just before midnight on Thursday, September 2nd, they sped rapidly onwards through Manitoba. This is the pioneer province, the Red River Settlement in these fertile valleys being for a considerable time the only agricultural community of this western district, and having grown from small beginnings to its present eminence. Southern Manitoba is a wheat-growing prairie, whilst the northern parts of the province are broken by large lakes and vast forests, the woods and the minerals forming a source of wealth for many generations yet to come. The climate is delightful, the air being dry and sunny in the day and

cool at night. Portage la Prairie and Brandon (one of the largest grain markets in Manitoba) were soon passed and the Regina plain entered. At the attractive capital of Saskatchewan the party arrived early on the 3rd, and were met by many of the leading inhabitants. Motor drives and walks were taken during the morning and the chief buildings visited. The men of the party were publicly entertained at luncheon in the City Hall, the ladies being received by the Lieutenant-Governor and his wife at Government House.

Proceeding onwards to Moose Jaw, another warm greeting awaited the members. The time has gone by for regarding the Colonies with coldness or apathy, and most persons of British race are now interested in Imperial questions. But even the greatest enthusiasts of Imperialism with the expedition, or those who regarded such matters with aversion as mere racial prejudice and greed, were equally united in expressing the opinion that the loyalty of many of the Canadians, and the warmth of their affection for the Mother Country, could hardly be estimated by those who had never travelled through the great Dominion.

In his Inaugural Address at Winnipeg the President's opening remarks had been received with unmistakable appreciation when, in speaking of this Canadian visit, he said :

> Men of science welcome it for the increased opportunities it gives them of studying under the most pleasant and favourable conditions different parts of our Empire, and of making new friends. Such meetings as these not only promote the progress of science, but also help to strengthen the bonds which bind together the different portions of the King's Dominions.

At Regina and Moose Jaw the national flag floated on all public buildings, and under a triumphal arch erected in the latter city speeches were delivered

expressive of warm devotion to the Empire, as well as of hearty welcome. Later in the day, at the banquet held in the skating rink, the King's health was received with the utmost enthusiasm, and loyal speeches were listened to with the same fervour and warmth of feeling.

The province of Saskatchewan is noted as a great wheat-growing country on account of the fine climate and fertile soil. Here again the nights are cool and pleasant even after the hottest days. Western Canada is growing most rapidly in wealth and importance, the phenomenal agricultural progress of the three provinces, Manitoba, Saskatchewan, and Alberta, forming a remarkable record in the history of the distant territories of the Empire.

On Saturday, September 4th, a short stay was made at Gleichen to view a band of Indians, this picturesque incident adding to the variety of the journey. Gleichen and the neighbouring stations adjoin the Blackfeet Indian Reserve.

Early that afternoon Calgary was reached, and on arriving in Alberta the same cordial welcome was extended to the visitors as in Saskatchewan and Manitoba. Here Mrs. and Miss Pinkham, the wife and daughter of the bishop of the diocese, came to greet Forbes Julian and his wife. Bishop Pinkham (whom the present writer had recently met in London) was unfortunately absent, but the kindness of his family added much to the pleasure of the day. So it was that everywhere in Canada the travellers felt at home in every sense, and scenes which to the eye were strange seemed familiar through the friendliness of their hosts and guides. Besides those who were Canadian-born and thought of Great Britain as of the land of their forefathers, there were many who had made the Dominion their home and yet had loyal longings for the land of their birth, of their family

and friends. The problems confronting the young and vigorous provinces were freely discussed. Here these subjects could be approached without the influence of those heritages of the past that appear sometimes to weigh so heavily upon the present in older communities.

It will be readily understood that with a large mixed population an interesting economic and political situation is created, and that the questions affecting the Canadian people are numerous and complex. Forbes Julian and his wife had the privilege of being present on more than one occasion when the subject of naval defence in connection with the maintenance of British supremacy at the present critical epoch was discussed by Sir William White and certain leading inhabitants of the cities through which they passed. Sir William's admirable summary of the situation was listened to as the demonstration of a master, and not only with close attention but also with cordial sympathy.

Calgary is pleasantly placed on a hill-girt plateau, overlooked by the white peaks of the Rocky Mountains, and it is the most important city on the Canadian Pacific line between Winnipeg and Vancouver. After an enjoyable stay, during which many institutions and public buildings were inspected, the members were entertained at an evening banquet, and their special train was entered again at night.

The cathedral appears to be the centre of much useful work, and a feeling of brotherly co-operation exists in Alberta between members of the Anglican Church and those belonging to other Christian bodies, the only rivalry in social service being an honourable emulation in good works. Some conversation was held with Bishop Pinkham's family concerning the needs of the colonial Churches and various matters, such as the bringing of Christian teaching to bear on

the lives of the settlers. The hardships encountered by the pioneers, the difficulties overcome, and the sacrifices made for the Empire produce fine and self-reliant characters ; but in a new and wealthy country there is frequently a tendency for the people to become materialistic. When settlers coming from Great Britain find Anglican, Presbyterian, Roman Catholic, and Free Churches already established in the Colonies many of them loyally support their places of worship ; but if for years they remain out of touch with their former spiritual life great difficulty is experienced in again gathering up the threads. The secular education in Western Canada is excellent, and it is a matter of importance that the atmosphere of church life at home should be maintained so as to develop the vitality of the Christian life and combat the growing danger that materialism and spiritual apathy might gain permanent hold on the people.

Alberta contains one of the richest soils in Western Canada, and has recently made marvellous strides in grain-producing ; it is also known as a great stock-raising district. In addition it has mineral wealth and a bracing climate, the summer and early autumn being specially delightful. The fertile river-banks are well wooded with groves of aspen, poplar, and spruce ; tranquil lakes also diversify the landscape and enhance its beauty, and the valleys are carpeted with turf and fragrant with many a wild flower.

The most attractive part of the tour was now at hand, and on Sunday, September 5th, the travellers awoke to find themselves in the impressive scenery of the Rocky Mountains. A bend in the line brings the train between two almost vertical walls of great height, this being the Pass by which the mountains are entered. In approaching the station—appropriately named The Gap—a marvellous view is obtained of Wind Mountain,

the Three Sisters, and other rocky ramparts of the district where Nature is seen in her grandest aspect.

After passing the corral with a number of buffaloes, Banff was the next stopping-place, this being the station for the National Park, which embraces parts of the valleys of the Bow, Spray, and Cascade Rivers, and also Lake Minnewanka, thus preserving a beautiful bit of country untouched. Here several magnificent mountains meet the eye. Laggan and lovely Lake Louise, enshrined amongst the hills, were visited the same day. Not far distant are Lake Agnes and Mirror Lake, both of which lie literally above the clouds; and the celebrated Valley of the Ten Peaks is within easy access. The quiet Sunday spent amongst such surroundings was much valued, these scenes of marvellous majesty and grandeur being calculated to impress the mind with profound reverence and awe.

The beauty of Lake Louise is too famous to need further description, with its varying green, blue, and purple shadows, which change with every hour of the day.

Field (with the well-known fossil beds) was soon reached, and the following day many hours were spent in viewing the Illecillewaet glacier in British Columbia. The mountain peaks, Sir Donald, the Eagle, the Avalanche, Roger's Pass, the Selkirks, and the Hermit range, seen towering above and lifting their bold peaks and snow-capped summits far into the blue sky, made up a series of supremely beautiful pictures which will be long remembered, and especially the sunrise in the heart of the mountains. The mighty glacier with its surface lit up and flecked with many hues in the sunlight aroused great enthusiasm, particularly amongst the geological members, who were deeply impressed by its beauty and interest. On the walk through the winding wooded paths from the station to the glacier, Forbes Julian and his wife had the pleasure of accom-

panying Dr. Smith Woodward, as the distinguished scientist was with the party, being President of the Geological Section. The whole of the journey from Calgary to Vancouver (a distance of considerably over six hundred miles) is remarkable for the romantic character of the scenery, the mountains and valleys where the shadows lie darkly forming a striking contrast to the sunlit prairies.

Arriving at Vancouver early on Tuesday, September 7th, the morning was spent at this picturesque place, the Pacific terminus of the railway. The city has already many fine buildings, abundant prosperity being everywhere evident, whilst its growing commercial advantages and rapidly increasing resources bespeak a still greater future. It is a centre of much activity, its mercantile and social eminence having been achieved in the last quarter of a century. The commodious land-locked harbour, with the excellent steamship service of the Pacific, has added greatly to its importance and prosperity. Its chief attraction is Stanley Park, which with the magnificent trees of gigantic growth forms one of the noted pleasure resorts of the continent.

Crossing by the Canadian Pacific steamer *Princess Charlotte* to Victoria on Vancouver Island, the travellers took up their residence at the Empress Hotel, which commands a fine view of the harbour. Victoria has been aptly described as "a transplanted section of old England"; the climate has the softness of Devonshire, and the town is peculiarly English in some of its characteristics. It is situated at the southern extremity of the island, overlooking the Straits of Fuca to the Pacific and the Gulf of Georgia towards the mainland. Owing to the clear atmosphere Mount Baker, situated eighty miles away in the United States, can be distinctly seen. In the evening

a reception was attended at the Parliament House, which is a most imposing building. On the following day one of the residents, Dr. Proudfoot, kindly took Sir Duncan Johnston and Forbes Julian and his wife for a long motoring expedition, passing through the naval station of Esquimalt and some of the most beautiful scenery in the island. They returned in time to bid adieu to the other members of the Association who were starting for Vancouver and Winnipeg. The metallurgist had wished to continue the tour to Australia, but time did not permit of this. He, however, was anxious to take his wife to see San Francisco, and to return eastwards through the States; he was also desirous of visiting some mining men at Grass Valley. Although this suggested a pleasant programme, they parted from their friends with much regret. Nearly a month had been spent with several members, mineralogists and geologists whom they had joined at Cobalt. The tour had been in every way enjoyable. It had brought Forbes Julian into contact with several leaders of British science, and he had formed acquaintance (and in some cases friendships) with many Canadians famous in the mining world whilst traversing the continent from Quebec to Vancouver.

A further short stay was made in the island. This enabled him and his wife to become better acquainted with the pleasant city of Victoria and its impressive Government buildings, and to enjoy drives and walks taken amongst park-like groves with the fine trees for which British Columbia is celebrated. Leaving soon afterwards for Seattle, in the United States, the short voyage was much enjoyed, with the fair expanse of ocean, bright blue and beautiful, bearing on its waters yachts and boats of all kinds, spreading their sails before the Pacific breeze.

At Seattle the important Alaska-Yukon-Pacific Exposition was visited, which gave some idea of the great potentialities of the Alaska and Yukon territories both to the United States and Canada.

From Seattle they struck southward for Portland, where a short time was passed in this charming district of Oregon, a drive taken on the Portland Heights furnishing many varied and extensive views.

Leaving Portland, they proceeded by rail to Oakland, and crossing to San Francisco, were soon settled at the Hotel St. Francis (facing Union Square in the heart of the city), which had been the metallurgist's headquarters during the previous autumn. Here he was welcomed by an English friend, Mr. G. S. Simpson, and some mining men of the district, and it afforded him much pleasure to take his wife to Golden Gate and Cliff House, where the glorious views have long been famous. In spite of the indescribable chaos and confusion caused by the earthquake and the fire, traces of which are still visible at every turn, the city, like other American centres, throbs with life and movement. Electric trams speed by in various directions; wagons driven by black men roll noisily through the streets; pedestrians, including many Orientals, crowd the side walks; carriages and motors flash past in apparently interminable lines. The city is much more attractive than New York or Chicago, and the lovely views obtained of the Pacific were greatly appreciated, the harbour being one of the most beautiful in the world. The remarkable progress of California during the last half-century is typical of the rapid methods of American business enterprise. The fine foliage was much admired, but at Sacramento, which was the next stopping-place, the flowers and plants were even richer and more varied. The mining district of Grass Valley, situated in the midst of charming Californian

scenery, was also visited, where some acquaintances were met with. Continuing their journey eastward, they proceeded through Nevada.

In Utah, after passing the Great Salt Lake, a short stay was made at Ogden. The journey was then continued through the States of Wyoming, Nebraska, and Iowa to Illinois, only a short time being spent in Chicago, where the lake is the chief attraction.

This busy centre (which Forbes Julian had frequently visited) is not a city of one race but of several with its vast tide of humanity. Here great enterprises are undertaken and remarkable industrial results accomplished. However, its chief features have been so fully described by other travellers that any further account is unnecessary.

Leaving for Buffalo, it was disappointing that time did not permit the continuing of their journey to Toronto, as they were so near Canada ; but they were obliged to hasten southwards to New York.

During this journey across the continent they had fortunately secured a private compartment, otherwise they would have been in the Pullman car with its numerous occupants. In these cars travellers have to go into their berths fully dressed and, after fastening the curtain, to undress in a cramped and crouching position. The unpleasant character of a long journey under such conditions can readily be imagined.

The general holiday prevailing in New York for the Hudson-Fulton celebrations enabled the metallurgist to spare a day to see the picturesque pageant with his wife. October and November were spent at Atlantic Highlands, in New Jersey, where they enjoyed the society of Mrs. Briggs, the widow of an Episcopal clergyman of New York and daughter of the late General Duryea of the Northern Army. This lady's two sons (both officers in the United States army)

often visited their mother, and related many incidents of the Cuban War, in which they had been engaged. This was the more interesting to the visitors as they had also gathered trustworthy accounts, from the Spanish point of view, from their friend Madame la Comtesse de Alcoy, whose late father-in-law some years previously had been commander of the troops in the island.

In October Sir William and Lady White sailed for England on the R.M.S. *Mauretania*, and the metallurgist and his wife were present to bid them and other friends good-bye.

Through Sir William's presidency of the Engineering Section, to which he had induced Forbes Julian to contribute a paper, and from their having been the two guests specially entertained by Devonians at the banquet in Winnipeg; and also owing to the close association which the long journey on the British Association train had brought about, the metallurgist obtained frequent opportunities of cementing a friendship with one whose scientific attainments he had long admired. The sister ship, the *Lusitania*, had been inspected in the spring, so that it was of additional interest to have some of the special features of the great liner explained by such a well-known expert in nautical matters, and it will be easily imagined how clear and illuminating the eminent naval constructor made every detail on which he touched.

During October and November Forbes Julian was closely engaged with technical matters in New York in collaboration with Dr. Chandler and Mr. Harold Binney, throwing himself with renewed enthusiasm into this work, after the various visits made to mining centres in other parts of the States and in Canada.

CHAPTER XVII

FOUR VOYAGES ACROSS THE ATLANTIC

AFTER spending the remainder of the autumn in New Jersey, the travellers returned to England by the R.M.S. *Oceanic*. They landed at Plymouth by tender (whilst the steamer anchored to put off the mails) at four o'clock on a bleak December morning—anxious to reach their home expeditiously—and arrived at Torquay not long afterwards.

The home voyage had been marked by stormy weather from the commencement, the sea running in great ridges and the *Oceanic* mounting the crest of the waves and dashing clouds of glittering spray over the wild waste of waters. Though able to enjoy the trip in spite of the prevalent gales, they saw but little of their fellow-passengers, as many were suffering severely the whole way. Out of nearly a hundred saloon passengers a mere handful appeared for meals or ventured for a walk on the upper deck. The details of this crossing were uneventful, although a week at sea seemed ever enjoyable to Forbes Julian, to whom the sight of a ship, the society of sailors, and the incidents of a sea voyage were always a great pleasure, sufficing to inspirit him, however fatigued by overwork he might have felt on starting.

On arriving safely in England after the stormy passage and the long interval of ten months abroad, he was glad to revisit his old haunts in Torquay, for his fondness for travelling and a wider life never

weakened his love of home. When a few days had been spent in Devonshire, however, he hastened to London, where the usual Board meetings and correspondence awaited him at the office of the Butters Company. He also again took up active participation in research work, assisted by the fresh facts observed in the course of his journeys.

Pleased to be in town after prolonged absence and to meet Mr. Rickard and other associates, he wrote home in December describing his movements and his meetings with friends.

Christmas was spent at home, and in January 1910 he attended in town one of the Friday evening lectures in Albemarle Street given by Sir James Dewar, seeing many familiar faces amongst the audience. He writes :

> . . . I reached the Royal Institution a few minutes after eight o'clock . . . and saw Sir William Crookes, Professor Silvanus Thompson, Mrs. Ayrton, Miss Gladstone, Major and Mrs. MacMahon . . . and a host of others, who asked for you, and many of them kindly wanted me to look them up. . . .

During his week-end visits at home, gatherings given by Sir Peter and Lady Lumsden, Sir Francis and Lady Layland-Barratt at the Manor House, Colonel and Mrs. Cary, and other Torquay friends afforded opportunities of seeing many Devonian neighbours and acquaintance.

At the beginning of February he heard of the gold-fever in Canada, whither many people were already flocking in hot haste. It will be seen that his thoughts were more concerned with quiet country life than with the acquisition of wealth. He wrote home :

> There seems to be considerable excitement in Canada about the new gold-rush north of Cobalt. It is said that thousands have already gone there, and I hear Mr. Butters was amongst

them. It must be intensely cold there now. I would rather be in Devonshire. This is a fine frosty day, and I expect it is perfectly beautiful in Torquay. . . .

Always deeply interested in the great Dominion, he enjoyed later in the month going to a Canadian reception at South Kensington, and wrote the following account of it to his wife :

I have just returned from the Maple-leaf party. There were numbers of people present. I do not think there were many other members of the British Association, but I saw Lady Knightley of Fawsley and Miss Williams. I got there about four o'clock, and heard some French-Canadian recitations that were very well given, and also several charming French-Canadian songs. The best part of the whole entertainment was Miss Cameron's lecture on her travels in the North-west. She has an excellent flow of language, and with a large number of fine slides made her subject very attractive. Whilst tea was going on I went into another room, where some good slides were being shown of the scenery we visited on the Canadian Northern Railway. After that I returned to hear the second part of Miss Cameron's lecture, which was not over until a quarter to seven. I was glad to read in one of the mining papers that our friend, Professor Coleman of Toronto, has been awarded the Murchison Medal from the Geological Society this year.

On February 15th Sir Ernest Shackleton lectured at Torquay on the Antarctic Expedition, and it was a pleasure to meet him and Lady Shackleton again and to hear the recital of his remarkable exploit, which (as regarded his own achievements in recording how the dangers of the way, the pitiless cold, and other difficulties were overcome) was more than modest. In a conversation after the lecture he described, in his cheery and light-hearted manner, further details of the journey.

A letter received from Professor Harley later in the month alludes to Forbes Julian's wish to visit Australia,

and gives a glimpse of the mathematician's activities, of his meeting with the Bishop of London, and their mutual interest in temperance work.

ATHENÆUM CLUB,
22nd Feb., 1910.

It was kind of you to remember my birthday in January. It is certainly something to have passed my eighty-second milestone. Truly, goodness and mercy have followed me all the days of my life.

I was interested in your remarks about the Americans and your Canadian experiences. I wish you could have gone on from Vancouver to Australia (as you desired), for then I could have compared notes with you. Last week at our monthly meeting of the London Board of Congregationalists we were favoured with a visit from the Bishop of London. He came early, had tea with us, and won all hearts by his brotherliness. The secretary introduced me to him and we talked together about a variety of things, such as the Athenæum Club, the late Archbishop Temple, Oxford, temperance, &c. He wanted to know if our men were keen on temperance, as that was one of the things he was going to speak to us about. His subject was "Our Common Enemy," which he said was hydra-headed—drink, impurity, subtle unbelief, worldliness, &c. He told us that he was made a teetotaller by a brickbat! Some years ago he was taken to a temperance meeting by two good women. Friends of "the trade" were trying to upset the meeting, but he and others resolved that they should not do so. There was a great row, and a brickbat was thrown at his head, missing him by only a quarter of an inch. That did the business! He has been a teetotaller ever since. He gave us a clear, earnest, straightforward talk.

Have you gone back to America yet for that prolonged law trial? You will be thankful when you have not to leave home in this hurried way.

In the middle of March a cable was received from New York begging Forbes Julian to come out immediately. This intelligence was communicated to his wife in the following note from London, dated March 16th:

On arriving at the office this morning I found a cable asking me to be in New York about the 30th. I went immediately to see what boats were sailing, and found the most suitable were the *Adriatic* or the *Kaiser Wilhelm II.* I hope to go down to Torquay by early train on Friday, and this will give us three or four days together before leaving. I should like to have had Easter with you, but perhaps I shall be able to get back soon, as I want so much to have this summer at home.

Returning to Torquay on March 18th, he had the pleasure of meeting several friends the same afternoon —Lady Selina Stuart, Lady Olpherts, Colonel Aplin, Mr. Alfred Davis (a civil engineer), and others coming in to see him and his wife before his departure. On the 19th his aunt, Miss Neligan, arrived from Croydon to spend a few days at "Redholme," and an interesting engagement was formed to meet Sir John and Lady Kirk at a friend's residence, Argyll Hall, when the former gave some account of his life-work passed in the cause of helping neglected and suffering children, in the prosecution of which he has displayed such great steadfastness and faithful devotion. The metallurgist's love of children and care for their welfare was not the least important of his characteristics, and shows how little his heart was hardened by the passing of the years.

From off Queenstown he wrote to his wife on March 24th from the R.M.S. *Adriatic* as follows :

We left Southampton punctually at 11 o'clock and arrived at Cherbourg at 6, as the sun was disappearing behind the horizon like a ball of fire and the moon (which is nearly full) was just arranging (as they say in Ireland) "to serve us for lamplight all night in the dark." . . . The ship is fairly well filled. At table there is a pleasant young Canadian next me. He comes from Ontario, and crosses very often. Next to him is Mr. Allen, a kindred spirit, since he is a cyanide man who has travelled a great deal. There are large numbers of English people on board, a party of French, and some Americans.

Almost immediately after he left England a letter had been received from his Canadian friend, Mr. Leonard, who was anxious to secure his professional services, but, unfortunately, Forbes Julian was unable to undertake any technical work for him. In a letter to the present writer two years later Mr. Leonard says :

If his services had been available, there was no one whose advice in that particular line I would consider of equal authority.

Mr. and Mrs. Leonard had been in London during March, and had just missed seeing him. Writing home from the Murray Hill Hotel, New York, on April 5th, Forbes Julian says :

When I got to the office on Saturday morning I found your letter enclosing the one from Mr. Leonard. What a pity I did not see him in London ! . . . I have been to see Phelps, Dodge, and Co., the great company with whom Colonel Weir used to be connected. They asked Johnston to bring me over to see them, and I think they would like me to help them in the development of a new process, but (as yet) nothing has matured. . . .

Early in April he had the pleasure of meeting Mr. Greig and Lieutenant Briggs, whom he had known at Atlantic Highlands. Frequent mention is made in letters home during the spring of visits to the Players' Club, and also to Bronx Park, revealing his sympathy with the animal world.

Writing on April 12th, 1910, he says :

. . . People are interested in this big copper process scheme that promises such great things. If successful it may be almost as important as the cyanide process. This evening a friend drove me in his motor from the office to the hotel. On the way we stopped at the Players' Club, and he put me up for a fortnight. This is one of the most interesting places I have seen in New York. It is in a fine old mansion left for

the purpose by Brooks, the great actor. The walls are covered with pictures and relics, everything being most Bohemian. There are no formal introductions amongst members, and everyone is expected to speak to other members and be on friendly terms. The Club has a library of rare books, and altogether the place is most picturesque. Sunday was a brilliant day with a pleasant, cool breeze, and I hastened early out of town to see the animals at Bronx Park.

The middle of the month found him settled at Montclair enjoying the beautiful scenery of New Jersey, the fine golf links, and country life of that pleasant locality.

At the end of April he had the pleasure of meeting Mr. Leonard in New York and acting as his guide to General Grant's tomb and the Central Park, when various metallurgical investigations were discussed.

MONTCLAIR,
NEW JERSEY,
26th April, 1910.

On Saturday morning I went to the Cunard Pier to meet the *Campania*, which was expected about 10 o'clock. Mr. and Mrs. Leonard were very glad to have some one to meet them. They were not leaving until the 6 P.M. train, and we first drove to the Belmont Hotel and then went in a motor to Grant's tomb. They wanted to see this because an American, on the way out, told them what a fine thing it was. Mr. Leonard, who had recently seen Napoleon's tomb in Paris, said that he thought "they might have done better for their idol." Afterwards we wandered about the Central Park. The trees, creepers, and flowering shrubs are just now looking lovely, and they were delighted with the park.

We next went back to the Belmont Hotel, and then I saw them off. I had a very interesting cyanide conversation with Mr. Leonard. . . . He was much interested in the new copper process, and told me he had purchased a copper mine in Canada. . . . He wants me to go to them for a week or so when I have time. . . .

It will be remembered with what sincere sympathy

and sorrow the news of the death of King Edward was received in the States; a further proof of this is afforded by the next letter, which shows how much he was in the thoughts of those in the New World.

MONTCLAIR, N.J.,
10th May, 1910.

The only subject talked about since Saturday was the King's death. It was a shock that no one was prepared for. The papers here speak very warmly of him, and I hear that the pew that he used at Trinity Church when he visited New York as Prince of Wales is screened off and draped in black. On Saturday all the business houses had flags flying half-mast, and the exchanges closed immediately after opening. It is a *great* loss, and very sad that the King could not be spared to see the affairs of State more settled. King George will have a hard task before him. . . .

Beautiful spring weather was now being experienced in New Jersey, and the quiet Sundays there were a source of relief and refreshment after the rush and restless life of the great city. On May 17th, writing from Montclair, he says:

I went to the office on Saturday morning, but got back to Montclair early, and had a pleasant afternoon watching a baseball game and (later) the golfers. Montclair is a beautiful place. Sunday was glorious and I had a delightful walk over the "mountain," which is a wooded hill about two hundred feet high. The wild flowers were in bloom, and I collected a large bunch of violets and found a beautiful orchid. The wild cherry and the peach-trees, and numerous flowering shrubs, make the scene most picturesque. . . . Afterwards I joined Greig and his friends, so I had practically the whole day out of doors. . . .

On Friday there is to be a memorial service for the late King at Trinity Church, and I much wish to attend it.

Writing on May 20th, the day of the King's funeral, he describes the evidences of mourning in New York and the demonstrations of loyalty in Canada. The

keen, if somewhat unscientific, interest taken by many people in the comet is also mentioned.

On Wednesday night the streets and house-tops were full of people looking out for what might happen as we pass through the comet's tail; nothing unusual, of course, occurred, but the Northern Lights illuminated the sky slightly.

To-day the flags are half-mast throughout the city, and many of the business places about Wall Street are heavily draped in black and purple. . . . I see in this morning's paper that the Canadian Pacific Railway has arranged for a three minutes' cessation of all work on the whole of their systems; not a single machine is to move. This is in honour of the late King.

. . . . .

The copper proposition is still undeveloped. It refers to a copper-extraction process somewhat on the lines of the cyanide process, and promises great things. It is patented by the chief chemist of one of the companies, and he wants us to take up his patents and apply our knowledge in developing the process. It will, of course, take a great deal of money to build the plant and make the test on a commercial scale, but the development of this process promises, if successful, to assume an importance in metallurgy almost as great as the cyanide process. . . .

The copper process mentioned in these letters did not fulfil its early promise. At any rate there is nothing of the kind which would now bear comparison with the cyanide process, and two or three such anticipated revolutions did not eventuate, but as a new pathway of investigation had been opened up by cyanidation, this made him eager to undertake fresh researches.

References to ex-President Roosevelt occur in the following letter, as that strenuous statesman was shortly expected to return to the United States after his prolonged travels.

MONTCLAIR, N.J.,
17th June, 1910.

I hope to be back for the British Association at Sheffield, but it is too early as yet to say whether I could find time to prepare a paper to read there. . . . To-morrow Roosevelt

(the Kaiser of the Americans) is expected to arrive, and his friends in the Republican party have made great preparations for his reception. The Democratic papers are full of ridicule about him, and one of them is publishing a series of letters headed "How Roosevelt can best serve his country in future." Most of the letters are not complimentary! One says, "By putting a Muzzle on"; another, "By losing himself in an African Desert."

In a letter written on June 21st the reception accorded to ex-President Roosevelt in New York is briefly described.

On Saturday I was at the office in the morning, and saw from the window Roosevelt passing along Broadway. He was at the moment standing in a carriage with his hat off, smiling and bowing to the crowd. He was preceded by about fifty rough-riders on horseback, and there was a band playing and a great deal of enthusiasm, but his reception must have appeared very tame after all the demonstrations of welcome he received and all he went through in Europe and elsewhere. No doubt in a few months he will be forgotten, like other great men in this country. . . .

Towards the end of June Forbes Julian left Montclair and removed with Mr. Greig to Atlantic Highlands, where he was able (as in the previous year) to enjoy the boating and bathing.

Writing from Atlantic Highlands on July 1st, he describes the kindly welcome of his American friends there, and says:

I had a grand reception, and they had got the Union Jack to fly, to greet me on my arrival. Greig has been busy all the week getting his boat ready; I gave him a hand whenever I had a little time to spare. Last night we launched her after an effort and much waiting for the tide. We hope to get a sail on Monday. I shall spend as much time as I can on the boat at Atlantic Highlands instead of being in New York. We are having very hot weather, but the trips on the steamer in and out are delightful.

Anxious to visit Mr. Leonard and see for himself more of the work of Canadian mining men on their own ground, he was disappointed in being unable to get away for a projected stay in the Dominion during the holiday period for the Fourth of July. He was, however, fortunate in enjoying the sea air and charming surroundings at Atlantic Highlands, for a heat-wave rendered life in the city extremely oppressive.

ATLANTIC HIGHLANDS,
5th July, 1910.

I left for Atlantic Highlands by an early steamer on Friday afternoon in the hope of escaping the crowds going away for the Fourth of July, but the boat was packed. It was very hot, which made everyone who could get off rush for the country as soon as possible. Saturday and Sunday were still hotter without a breath of wind, and every boat as it arrived at Atlantic Highlands was crammed. We were told that the piers in New York were crowded with people vainly trying to escape from the city. Greig and I spent Saturday and Sunday on his boat.

On Monday morning a cool wind sprang up, and the day was glorious. All the oppressive heat was gone, and the air became delightfully bracing. We started early, when there was a good stiff breeze, and went across to the Hook and made about a thirty-mile detour. It was a lovely sail. . . .

The Fourth of July dawned with the usual noise of crackers and guns, and in the evening there was a display of fireworks.

In the following letter he alludes to his wife's visit to the Royal Society, when an interesting paper was given by Mr. Clement Reid dealing with the Bovey Tracey deposits, which had previously been investigated by Mr. Pengelly and his colleague, Dr. Heer of Zürich.

Sir Archibald Geikie, the President, paid a warm tribute after the reading of the paper to the labours and the memory of his old friend Mr. Pengelly.

On the other side of the Atlantic Forbes Julian

followed with much attention the work of many of the London scientific societies, for his interests were not confined to his own inquiries, but his mind ranged over many departments of knowledge, and he showed keen sympathy with their advancement.

ATLANTIC HIGHLANDS,
12th July, 1910.

I was very pleased to hear all about the Royal Society. I should so much like to have been with you. . . . I am glad to have the abstracts of those physical papers you sent, and will read them in the boat this afternoon. I was also delighted to hear about the Bovey Tracey paper by Mr. Clement Reid and the references to your father's work. . . .

On Friday afternoon I caught an early steamer back from New York so as to enjoy the cool sea breezes. I did not go into the city on Saturday, but at 6 A.M. four of us went for an early walk in the woods. All being interested in botany, we made a good collection and brought back many specimens. On Sunday afternoon there was a stiff breeze, so that we were able to have a delightful sail. In the evening we discussed theosophy, Briggs being very amusing in his racy American way. . . . Two lady artists have taken his bungalow, and Briggs went to see them, and gave us a most graphic account of the interview. One of these ladies seems to be a championess in everything—swims several miles out from shore, sails her own boat, boxes, and wears men's boots! Her companion is a fragile creature, but is equally active and energetic in her own way.

You will be interested to hear that Mr. Leonard has been appointed one of the Governors of Toronto University, to fill the vacancy caused by the death of Goldwin Smith.

At the beginning of August he again crossed the Atlantic, and landed on the 11th by tender at Plymouth in the small hours of the morning.

Leaving New York at a few hours' notice and taking the first steamer available, he was unable to obtain a cabin to himself, but this really enhanced the pleasure of the voyage, as his companion in the state-

room was Captain Harlow, a distinguished officer of the United States Navy and a genial companion with whom he became very friendly.

On the afternoon of his arrival he and his wife were present at a garden-party in the historic grounds of Torre Abbey (formerly one of the great Houses of the Premonstratensian Order of Canons in England) given by Colonel and Mrs. Cary. As the gathering was numerously attended, it enabled him to exchange greetings with a large circle of friends, by whom he was warmly welcomed.

Being much interested in the Naval manœuvres taking place, it was naturally a disappointment to have been too late to witness the inspection of the combined fleet of battleships held by His Majesty King George a few days earlier in Torbay. This was the first review held by our sailor King, whose interest in naval matters has remained so keen ever since the period of his own blue-water days. To all Devonians, especially to those dwelling near Plymouth or Dartmouth, the nursery of so many distinguished sailors, the Navy is a symbol of the strength and glory of the kingdom.

Having only a month to spend in England, the metallurgist soon visited London for a few days and made arrangements concerning the voyage westward with his wife in September.

It was expected that they would return to England for Christmas, but the exigencies of his professional work actually kept them in the States until the following summer.

At the end of August they left Torquay to attend the British Association meeting at Sheffield. The gathering in 1910, although not large, was especially attractive to them as the President, Professor Bonney, was an old and valued friend. There was a strong

body of geologists present, including Sir Archibald Geikie and Professor Coleman, of Toronto, the latter being chairman of Section C.

At the Physical Science and Chemical Sections there were some papers of outstanding scientific merit, particularly those given by Sir J. J. Thomson on "Positive Rays," and by Sir William Ramsay on "The Molecular Weight of Radium"; whilst a joint discussion between Sections A and B on "Gaseous Combustion" was especially noteworthy from the fact that Sir J. J. Thomson, Sir Oliver Lodge, Professor H. B. Dixon, Professor Smithells, and Professor Armstrong took part. It was said that the meeting of 1910 would be always remembered as that at which the achievement of at last isolating the positive electron was announced by Sir J. J. Thomson.

In the midst of this week of scientific activity a drive through the Dukeries on Saturday with a few other members was much appreciated. Some lovely parts of Sherwood Forest were visited, and they were hospitably entertained at Welbeck Abbey by the Duke of Portland and at Clumber by the Duke of Newcastle.

On Sunday morning a service was attended, at which Dr. Cosmo Lang, the Archbishop of York, preached to a crowded congregation from the text "Wisdom in all ages entering holy souls, maketh them friends of God." In the afternoon an impressive address was delivered by Sir Oliver Lodge in one of the public halls.

A garden-party given by Lord and Lady Fitzwilliam at Wentworth Woodhouse, the soirée at the Town Hall, and an evening conversazione held by the Duke and Duchess of Norfolk at the Museum and Mappin Art Gallery, with various other receptions, added to the pleasant social side of the gathering and afforded

opportunities of meeting friends before the approaching absence in America.

An invitation to hold the Association meeting in Australia in 1914 was received at Sheffield and, after some opposition, was finally accepted by the members of the General Committee. Forbes Julian, being strongly impressed by the importance of Imperial unity, was naturally in favour of the proposition. During this week he had the pleasure of becoming acquainted with Dr. Orme Masson, the well-known Professor of Chemistry at Melbourne University, one of the delegates. The metallurgist had long cherished the hope of visiting Australia, but, unfortunately, this wish remained for ever unfulfilled.

Immediately after attending the last meeting of the General Committee he left Sheffield with his wife on their way to London, and, starting by the boat train for Southampton on the 10th, he was glad to find that Captain Harlow was again to be a fellow-passenger on the *Philadelphia* of the American Line. The voyage was rendered enjoyable from the friendship formed with a pleasant American family. Their society and that of Mr. Waterbury and Mr. Faversham, the actor, with his wife Miss Julie Opp, the gifted actress, greatly enlivened the week at sea on this fourth trip across the Atlantic taken by the traveller within a period of nine months, during a run of rapidly succeeding voyages.

Landing early on Saturday, September 17th, he and his wife spent a few days at one of the New York hotels and then proceeded to New Jersey, settling at Montclair, in the well-known hotel situated on the Watchung Mountain. The change from New York was pleasant and beneficial, as the elevation of Montclair Hotel on the breezy hill-side ensured invigorating air and gave a coign of vantage from which extensive views

could be obtained in all directions. To the west lies a picturesque wooded hill country full of pastoral charm, to the north and east the populous valleys of the Passaic and Hackensack, whilst beyond flows the fine Hudson River, giving variety to the landscape and greatly enhancing its beauty. On the south is Orange, and not far away are visible Newark, Jersey City, New York harbour, and Staten Island, with the sea for a background.

Some time was passed amongst these pleasant surroundings, Forbes Julian going to and fro daily to the city to continue his technical labours.

Later in the autumn he had sufficient leisure to take his wife on a visit to their friends Mr. and Mrs. Lawrence Dawes, at Pittsfield, Massachusetts, where their host (a son of the statesman Senator Dawes) and his wife received them with cordial hospitality.

Both in the North and South (for Virginia was visited soon afterwards) their welcome was most kindly, and as their hostess belonged to one of the old-established families of New England and had many relatives settled in the neighbourhood, they had the opportunity of seeing much of American home life and enjoying the cultured social atmosphere of a delightful circle. The neighbourhood of Pittsfield and Lenox has long been famous as the resort of not a few men who have stood in the foremost rank of American literature; the homestead of Oliver Wendell Holmes, and Longfellow House (the scene of his poem "The Old Clock on the Stairs"), and other famous dwelling-places rich in literary association were amongst those pointed out to the travellers.

They much enjoyed the drives and motoring expeditions taken through the well-wooded country, bright

with the varied tints of autumn, or by the river-side, with fine views of the surrounding Berkshire hills and the Poutoosic Lake. At every turn water and woodland, hill and dale clad with grass and flowers, delight the eye and lend beauty to the scene.

Leaving for Albany after a short stay in Massachusetts, they journeyed northwards to Buffalo, crossing the border into Canada, where some time was spent as the guests of Mr. and Mrs. Leonard at St. Catherine's, this being Forbes Julian's fourth visit to the Dominion. It was impossible to be staying in Ontario without devoting time to revisiting old ground and again studying the Falls of Niagara, which he had twice previously seen, first in the height of summer and then in the snows of winter, so that this third sojourn there, with all the glory of the autumn foliage, was highly appreciated and afforded a striking contrast to both the former expeditions, each succeeding visit only serving to make the sight more wonderful and impressive of the ever-falling mass of water with its thunderous sound.

The beauty of the fading leaves makes the autumn one of the most delightful seasons of the year in Canada. Then the forests are rich in the most varied colouring—the elm of a deep yellow, the maple of a bright crimson, other trees of lovely shades of orange and scarlet. These tints contrast finely with the masses of dark green foliage that adorn the landscape, and give an indescribable charm to the woodland scenery.

Always happy amongst the hospitable Canadian people and greatly enjoying the discussions with his host, a fellow-worker in the same field, a man full of information and well qualified to give an opinion on matters connected with mining and metallurgy, it was naturally a disappointment to have to break off this

pleasant intercourse; but the time was limited, and all too soon he and his wife had to leave their kind entertainers and move southwards. They had been singularly fortunate in a spell of bright autumnal weather, but, just as they were preparing for departure, storms of rain, sleet, and snow heralded the approach of winter.

CHAPTER XVIII

VIRGINIA

AS soon as Forbes Julian and his wife had concluded their Canadian visit they returned to New York. After spending some time there in professional work he found that a short visit in the South could be arranged, being anxious to revisit Virginia, through which they had only journeyed very hurriedly in 1907, the year of the Tercentenary.

Like other travellers of British race, they found the Old Dominion specially attractive, and at Richmond, Alexandria, and many other places the early colonial houses and churches reminded them forcibly of home. Virginia was the land where the earliest English colonists tried to gain a foothold in the New World, and the first permanent English settlement in America was made at Jamestown, Virginia, in 1607, by Sir Thomas Gates and his Company, who obtained a charter from King James I to plant two colonies in Virginia. A couple of years later the London Company succeeded that of Gates, which had merely held the settlement for this brief period and given to the world the exciting and well-known adventures of Captain John Smith. It is stated that the first settlement on part of the site of Richmond dates from 1609, and that Fort Charles was built as a defence against the Indians nearly forty years later. Although still a small village, it was made the capital of the State of Virginia in 1779, and for about four years,

from May 1861 until April 1865, Richmond was the seat of the Confederate Government.

As little or nothing of Forbes Julian's correspondence during the tour has been preserved, a short account compiled from journals kept at the time by the present writer may serve to give some idea of the scenes that came under the travellers' view and of the impressions received.

This description of the Southern journey, like the account of the Northern tour in Chapter XI, is left in the first person, and almost as originally given in the diary.

Compiled from Mrs. Forbes Julian's Journals

"Whilst at Richmond my husband and I stayed at the comfortable Jefferson Hotel and received almost as much courtesy and kindness from the strangers met with as we could have experienced from old friends. These Southern families were invariably courteous, hospitable, and refined.

"We found many of the drives in the neighbourhood most enjoyable, the views of the surrounding district and of the River James being extremely fine. The streets are wide, well paved, and well lighted, and no unsightly elevated railways or huge skyscrapers disfigure the pleasant capital of the South. The climate is mild and genial, but varies greatly in different parts of the State. It seemed like summer to us, after so recently leaving sleet and snow in Canada.

"Our attention during our stay at the former capital of the fallen Confederacy was particularly directed to the memorials of the Civil War, and indeed almost everything there was calculated to concentrate our thoughts on the awful struggle of half a century ago, when some of the fiercest and most hardly contested battles took place near the city. Less than 120 miles

separated the rival capitals of the Union and the Confederacy, for Richmond is only 116 miles south-west from Washington. It is about the same distance above the entrance of Chesapeake Bay, and is situated on the northern side of the James River at the point where the lower falls mark the limit of the tide ascending from the Chesapeake. It is built on a group of several hills, and on the other side of the James, connected by bridges, stands the suburb called Manchester. We drove over there one afternoon and obtained an extensive view of the city, looking across the shining reaches of the river. Main Street is a fine thoroughfare of the old Southern style, the large portion that was destroyed in the conflagration of 1865 (at the close of the Civil War) having been rebuilt in keeping with the houses that escaped the fire. The parks and public gardens are planted with fine trees and flowering shrubs, and in some of its general features Richmond reminds one slightly of Edinburgh.

"Our first visit was to the Capitol or State House, a conspicuous building situated on the summit of Shockoe Hill. It was designed by Thomas Jefferson after the model of the Maison Carrée of Nîmes. Under the dome of the central hall we saw Houdon's marble statue of Washington, and near the western gates of the Capitol Square we also inspected Crawford's bronze equestrian statue of the same leader. Many historic scenes have taken place in the Capitol. Aaron Burr was tried for treason there in 1807, and it was used from 1861 to 1865 as the meeting-place of the Confederate Congress. The central building dates from 1789, but the two wings were recently added. Quite near is the Executive Mansion, a simple old-fashioned house, where Governor Letcher of Confederate fame entertained King Edward when (as

Prince of Wales) he visited Richmond in 1860, shortly before the war. The State Library adjoins the Capitol; here we found a valuable collection of historical portraits and papers, this being the most important library in the South. We saw the first Virginian newspaper which published the celebrated Declaration of Independence in full, dated July 26th, 1776. We were also shown many historical papers and writings, including autograph letters of Washington and Lafayette, the Bail Bond of the Confederate President Jefferson Davis (signed by Horace Greeley and Cornelius Vanderbilt), and some 'war letters' from General Robert E. Lee, with the last letter written to him by Stonewall Jackson just before the latter was fatally wounded at the battle of Chancellorsville.

"The portraits included paintings of General Lee, General Pickett, of Gettysburg fame, Stonewall Jackson, General J. E. B. Stuart, and other well-known Confederates, in addition to those of George Washington, Patrick Henry, Thomas Jefferson, Henry Clay, and other celebrated Virginians of an earlier generation, besides a curious picture of the Princess Pocahontas.

"We also saw the Great Seal of the Confederacy, and the Southern flag which was used on the State Capitol and on all the public buildings during the war. It was unfurled for our inspection by an old Confederate soldier with loving respect and pride.

"We paid a pleasant visit to the 'White House of the Confederacy,' where we were kindly received by Miss Isabel Maury, a member of the 'Society of the United Daughters of the Confederacy.' This mansion was the official home of Jefferson Davis whilst he was President, and is now used as a Confederate museum. Miss Maury pointed out all the valuable war relics and portraits, and told us much of interest

concerning General Lee and President Jefferson Davis, both of whom she had known when a girl.

"We saw other war memorials at the Virginian Historical Society's unpretending building in Franklin Street. This was the home of General Lee's family after their beautiful Virginian estate at Arlington had been seized by the army of the North, and here he resided when on his brief visits from the seat of war. The city has several fine statues of the Southern generals, those of Lee by the French sculptor Mercier, of Stonewall Jackson by the sculptor Foley (given by English admirers), and of J. E. B. Stuart, the dashing cavalry leader, by Moynihan, being specially noteworthy. Stuart was mortally wounded at one of the later battles fought at Yellow Tavern in 1864. He had just defeated the Northern army under General Sheridan, which was encamped only a few miles north-east of Richmond, and the city was saved—but at great cost.

"It will be remembered that at the commencement of hostilities the Federal army under General MacDowell had been defeated by the Confederates at Bull Run, and that MacDowell was succeeded by McClellan.

"We drove out one day to inspect the battlefield of Seven Pines or Fair Oaks, where Lee defeated McClellan; the old fortifications and breastworks may still be discerned. In the adjoining military cemetery lie buried numberless soldiers who took part in the engagement. Other great battlefields which we saw were Mechanicsville, Cold Harbor, Chancellorsville, and Gaines Mill. A fine granite monument at the Hollywood Cemetery marks the resting-place of many thousands of Confederate warriors; and there are also memorials of President Jefferson Davis, General Stuart, General Pickett, and other distin-

guished persons. We remarked that the grounds were beautifully kept, and were informed by a Richmond lady who acted as our guide that the graves of the beloved dead were under the special charge of the 'United Daughters of the Confederacy.'

"It is remarkable that both the rival Presidents, Abraham Lincoln and Jefferson Davis, the arbiters of their country's destiny, were Southerners and Kentucky men. The striking career of Lincoln appealed to the imagination of numberless people through his marvellous rise from being first a labourer, then a clerk, afterwards a deputy surveyor and lawyer, and finally President.

"It is well known that before the war a feeling of aversion to slavery was spreading amongst many thoughtful people in the South. In Maryland and Kentucky the number of slaves had decreased; whilst in Virginia the institution, though bequeathed to them, was thoroughly disliked by large numbers of the best public men, and some of them imitated the example of Washington, whose dying bequest gave freedom to his slaves. His contemporary, Patrick Henry, however, who uttered in the Virginian Convention of 1775 the famous words, 'Give me liberty or give me death,' was not only a holder but also a buyer of slaves.

"We visited St. John's Church at Richmond where he made this oft-quoted speech. The spot where he stood is marked with a white tablet, the pews, sounding-board, and baptismal font being the same that were used before the Revolutionary War. There are several fine places of worship in the city, including the Roman Catholic cathedral, and we were specially interested in St. Paul's Episcopal Church. Here Mr. Davenport, one of the vestrymen, kindly showed us over the building, which we had already seen under

the guidance of the verger, a coloured man. It contains fine stained-glass memorial windows to General Lee and President Jefferson Davis; and Mr. Davenport rendered a graphic account of the service which he attended as a boy on that memorable Sunday morning of April 2nd, 1865, when a telegram from General Lee was delivered to the President at church stating that Richmond must be evacuated.

"Virginia has produced a remarkable number of truly great men, foremost amongst whom stand George Washington and Robert E. Lee. We visited Mount Vernon and Arlington, the homes of these famous leaders, and found much worth seeing in these beautiful and historic places, which (though situated in Virginia) are both much nearer to Washington than to the Southern capital.

"Mount Vernon, the home of George Washington, is finely placed on the Virginian side of the Potomac River. The picturesque mansion was built in 1743; it has two stories, and attics with dormer windows. In front of the house are pleasant lawns, and also a fine deer park. In the rear are beautiful gardens and orchards, with all the usual outbuildings of a Virginian farm.

"Coming to live there soon after his marriage with Martha Custis in 1759, Washington carried on farming until called to the field. He returned to Mount Vernon after Yorktown, and again after his Presidency. His residence there for so many years, and the presence of his tomb in the grounds, have made Mount Vernon one of the most memorable places in the South.

"At Alexandria in Virginia we saw the quaint old church, containing the unaltered pews of General Washington and of General Lee, both these distinguished soldiers having been vestrymen of Christ Church, Alexandria.

"Whilst in this neighbourhood we went on to Arlington, formerly the home of General Lee, into whose possession it passed after his marriage with Mary Custis. The family mansion stands on the brow of a lofty hill, whose slope stretches away to the Potomac River. The view we obtained here with the fine expanse of water highly delighted us, and all this part of Virginia is very picturesque and striking, the Potomac River being justly famed for the scenery on its banks, Chesapeake Bay also being considered one of the most charming stretches of water in the world. The Arlington grounds are of great beauty, with fragrant flower-beds and grassy lawns, the hill-sides being covered with fine oak-trees. We spent much time rambling about in this spot so full of associations with the past.

"When the Federal troops took possession of Arlington they turned the house into headquarters and the grounds into a camp. As the war went on, a hospital was established there, and finally the grounds were converted into a cemetery for soldiers.

"It is known that General Lee was himself in favour of the gradual abolition of slavery. His letters, dated long before the war, show that he recognized the injustice to the negro and the evil effects upon the master.

"We were informed that several years before Lincoln's Emancipation Act Lee had freed the few slaves he had himself inherited, and that he made arrangements later for the gradual emancipation of those on the estate inherited by his wife, Mary Custis, a descendant of Martha Washington.

"The remains of both the celebrated Confederate commanders, Lee and Stonewall Jackson, repose at Lexington in Virginia.

"We were fortunate in numbering among our

Southern friends a distinguished soldier who had served as a young officer under these great leaders, and been with General Lee at Appomattox when he was forced to surrender to General Grant's superior numbers, as the Confederate supplies were exhausted and the gallant band of soldiers reduced to a few thousands. Our friend told us that even in this desperate position every Confederate able to bear arms was still resolute and ready to do battle. His recollections of their campaigns and of his comrades were remarkably vivid and striking, even after the lapse of so many years. He mentioned many stirring incidents of heroism of which he had been an eye-witness, and which remained like a picture in his mind, together with descriptions of his great commander, whose modesty and nobility of character gained the respect and affectionate admiration of every man who served under him.

"When listening to our friend's dramatic descriptions, the stern realities of the war, with all its strategy and fine soldiership, seemed to pass in review before us with the engagements and forced marches as though we had been present and could have witnessed the daring and courage of the Southern soldiers, who fought with invincible spirit against overwhelming odds, even after the impulse of victory had died away.

"We found it intensely interesting to study the history of Lee's campaigns whilst visiting the battle-fields of Virginia ; and after concluding our stay there we returned through Washington and Philadelphia to New Jersey, settling down for the winter at Montclair, inasmuch as the easy distance from New York rendered it possible for my husband to go into the city daily to carry on his technical work."

CHAPTER XIX

BERMUDA

DURING December, as Christmas approached, it was found that owing to pressure of work it would be impossible for Forbes Julian to return in time to spend the festival in England. However, the hospitality and kindness of American friends rendered this second Yuletide season spent in the States a very pleasant period.

Amongst the group of men famous at this time in New Jersey were the Governor, Dr. Woodrow Wilson, since elected President of the United States, and Mr. T. A. Edison, the inventor. The travellers heard much respecting the work of the former at Princeton and elsewhere from friends who had long enjoyed the privilege of his acquaintance, and who gave the metallurgist introductions to the distinguished Governor and to the eminent inventor.

Dr. Wilson's writings touch an unaccustomed note in American politics. He urges his countrymen to remember that an account must be rendered of the methods of acquiring wealth, as well as of the means of disposing of it; to open their eyes to see that God is in the world, as well as Mammon; and to give to the weary workers some of the sunlight and free air of which they have been deprived but which were intended to be equally the birthright of all. His appeal is to the kindly and sympathetic side of human nature, and he has been aptly termed "a reformer wishing to restore, not to destroy."

The inventions of Mr. Edison were naturally of great interest to Forbes Julian, so that in the intervals of his own work in New York he found much to attract him in New Jersey. There were also many recreations, especially in driving and motoring; and as colder weather set in, coasting, snow-shoeing, and sleighing were popular pastimes, together with skating on the adjacent Verona Lake.

Unfortunately during the winter season of 1910–11 a severe epidemic of influenza attacked many persons in New Jersey. Forbes Julian was very ill for a short time, and his wife was completely prostrated for several weeks. Much cordial kindness was experienced from American friends sending up books and flowers, with notes of inquiry, or coming themselves to the sick-rooms, heedless of the risk of infection. The skilful attendance of Dr. Synnott, one of Montclair's well-known physicians (who, coming first as a stranger, soon became a friend), added to these other alleviations in helping to pass many tedious hours of convalescence; but no hotel, however comfortable, can ever be an ideal place for illness.

As winter gave way to spring, and his wife still continued delicate, Forbes Julian consulted Dr. Synnott as to the advisability of her taking a voyage, or obtaining change of air, a course which the physician strongly recommended. Too closely occupied to leave New York for any considerable period, he was finally able to arrange to take her to Bermuda, which was reached after two days and nights at sea, even that rapid voyage proving very beneficial.

The short visit to this beautiful British colony afforded them both much pleasure. It was always a gratification to be under their own flag, and the mild climate and charming scenery were of great assistance in promoting recovery.

A trip to the Bermuda group of islands embraces much pleasant variety. Passengers are seen waiting for the tender to take them to the steamers, others are starting in glass-bottomed boats for the marine gardens, yachts skim swiftly over the waters, and British soldiers and sailors are to be met with at every turn. On landing an animated scene is presented by Front Street, which is the main thoroughfare of Hamilton and a lively business centre. On one side it is bordered by wharves, on which are capacious sheds for protecting freight. The Bank of Bermuda, the headquarters of the Royal Yacht Club, and the offices of the steamship companies are adjacent. In Parliament Street and Church Street there are other important buildings. The weather during the winter being delightful attracts quite an army of American health- and pleasure-seekers from New York and other parts. The climate is essentially marine, so that during the summer months the heat is never oppressive, the only drawback being the violent hurricanes that occur occasionally in the early autumn.

The different islets forming the Bermuda group have been variously estimated as numbering from a hundred and fifty to four or five hundred, many being but bleak and barren rocks, and only a small number partially covered with verdure. Scarcely twenty are inhabited, whilst but a few—namely, Great Bermuda, St. George's, St. David's, Cooper, Somerset, and Ireland—are of any considerable size. All these have been connected by causeways and bridges.

Although the strip of land thus formed is barely twenty-five miles in length and never more than two or three miles in width, frequently indeed much less, yet in spite of this limited area Bermuda (hardly containing twenty square miles, equal to but an eighth part of the Isle of Wight) is so advantageously laid

out as to possess a hundred miles of excellent roadway. Formerly the capital was St. George's, but in 1815 the seat of Government was moved to Hamilton, a city eminently picturesque in respect of its charming situation and pleasant villas and mansions, with their broad verandahs and attractive gardens. Here the travellers landed by tender. The Customs examination afforded a pleasant contrast to the elaborate ordeal undergone when arriving from England in New York, the Custom House officer being soon convinced that their belongings were innocent of articles of a contraband or dutiable character.

One of the most enjoyable expeditions was to view the caves which render the island famous. The Crystal Cave with its rich variety of stalactites and stalagmites in different stages of formation is specially attractive. It has only recently been discovered, and was named from the snow-like whiteness of the interior. Joyce's Dock Cave, near the causeway, is also very striking both for its great extent and the beauty of its subterranean halls. Like the Crystal Cave, it can boast of a lake. It has long been known, and is a favourite resort both with the islanders and visitors. The Admiral's Cave is also well worth seeing.

A novel and fascinating feature of Bermuda travel is the excursion to the Reefs, made by boats with heavy glass plates at the bottom, through which the beautiful " marine gardens " may be easily discerned through the clear and limpid water. Forbes Julian was specially interested in viewing a diver going down to cut coral, and in seeing the angel-fish and other beautiful forms of marine life, in addition to the striking coral formations. Always attracted by diving operations, he had himself gone down some years before in a diving-bell, and had paid a considerable amount of attention to the subject. The excursion

to view the marine gardens can only be made in calm clear weather with a smooth sea, so that visitors are often obliged to leave the island without having accomplished it.

A pleasant drive was taken through the Victoria Park, which is noted for its fine trees and bright flowers. The oleander flourishes in the islands, and likewise the Bermuda cedar, whilst groves of palmetto and hedges of tamarisk are to be seen, as well as the juniper, rubber, and mulberry tree. The poinsettia, bougainvillea, bamboo, and aloe are all cultivated in the gardens, delicate ferns such as the maidenhair are extremely plentiful, and the hardier osmunda and bracken abundant. Several English plants are to be met with, as well as those of a subtropical character, their great luxuriance of growth being attributable to the warmth and moisture of the climate.

The aquarium has more than a local celebrity, as professors and students of marine zoology visit it in considerable numbers during the summer to carry on studies at the laboratory.

The importance of Bermuda as a naval station has long been recognized, and its floating dock is too well known to need more than a passing reference. It well repays a visit, and was one of the chief points of attraction to the travellers.

The colony is administered by a Governor, Council, and House of Assembly. The Governor is appointed by the Crown, being usually a general officer of the Royal Artillery or Royal Engineers. A brother of Lord Kitchener, Sir W. Kitchener, held the post at this period (April 1911), and his death not long afterwards was a great loss to the community. It was a pleasure to meet him on this visit.

An enjoyable expedition was made to the quaint little "Devonshire Church" (with its venerable cedar-

tree, used generations ago as a belfry), the name having proved attractive from its homelike associations. After viewing the church and the Spanish Rock with its curious inscription, supposed to be a record of some early visitor, the drive was continued to the Flatts at Harrington Sound. This is a charming piece of inland sea, and at the beautiful cove may be noted the varied colours of the water. A lovely panorama of the inland salt lakes, the islets, and stretches of sandy beach here greets the eye, the fine views of the silver sea obtained from all parts of the island, together with the beauty of the foliage, making up a never-ending series of exquisite scenic effects. The vegetation is of rapid growth, and the fields and hillocks or mounds are clad with a mantle of perpetual green.

As geologists count time, Bermuda is of recent formation, and is an atoll with a central lagoon produced through the marvellous labours of the coral animal. It is worthy of note that, with the exception of Bermuda, there is not a single coral reef in the central expanse of the Atlantic.

It will be readily understood that the coast is of a dangerous character, the islands being encircled by a chain of fringing reefs and sunken rocks, with only a small number of navigable openings, all highly intricate and unsafe unless traversed with the aid of a pilot or under other experienced guidance. The two lighthouses, situated one at each end of the cluster of islands, enable passing ships to descry the Bermuda lights when more than thirty miles away. The islands of the Great Sound, on which 6000 Boer prisoners were at one time lodged, aroused considerable interest; and here, as at St. Helena, the incidents related by South African commandants met with in the Transvaal and Orange Free State came back to the mind. Stories heard from friends in the Southern States of

America were also recalled respecting the exciting events of which St. George's was the scene, being the rendezvous for some of the fast steamers running the blockade in the days of the Confederacy.

Unfortunately, Forbes Julian was obliged to return to New York during Easter week, and on Easter Eve his wife sailed for England, being glad to find some English friends on the vessel. The metallurgist returned to New York by the first steamer available a few days after her departure, spending Easter Sunday at Hamilton.

Several noteworthy buildings have recently been erected in the capital, the most important being the Anglican cathedral, the finest and largest church on the island. Visiting it with his wife on the afternoon of Easter Eve, just before she left, he afterwards accompanied her on the tender to the steamer *Avon*, of the Royal Mail Line, and they parted on April 15th, the date which in the following year was to usher in a sadder separation. On Easter Sunday he attended the parade service of the Garrison Church at Prospect in the morning, and in the evening was present at the cathedral for evensong. Writing to his wife after her departure from Bermuda, he described both these services.

HAMILTON, BERMUDA,
18*th April*, 1911.

On Easter Sunday I went to the barracks to see the Church parade. There was about ten minutes' drill before service, and the band played excellently. A crowd of sightseers was present. The church is a small iron structure, which was nearly filled by the soldiers. The civilians crowded in at the back. I was at the side-door, where only the officers and their families are allowed to enter. I was shown into a seat in the pew immediately behind the Governor, Sir W. Kitchener. . . . The music was supplied by several stringed instruments and two wind instruments. There were about a dozen choir-

boys. . . . After service the people collected round the band-stand, and for an hour were treated to selections of music. In the afternoon I took a long walk, and found myself close to the ruins of the old floating dock we had seen from the boat. I passed several pretty villas on the way and some houses with fair-sized grounds. At the entrance to one of these I saw the notice :

"Tramps must not, and surely ladies and gentlemen will not, trespass."

In the evening I went to an impressive service at the cathedral. The Lessons were read by an elderly clergyman and the preacher was a younger man. . . . The streets were very quiet. . . .

. . . I had a good view of the S.S. *Avon* on Saturday until she passed behind the land. . . . I have made the acquaintance of some of the people at the hotel, and had a walk round the town. Easter Sunday was bright and sunny here.

In the next letter home he describes an expedition to the Coral Reefs in one of the glass-bottomed boats.

HAMILTON, BERMUDA,
22nd April, 1911.

I greatly enjoyed the view from my room looking out over the bay with its pretty islands. I did not take any more drives after you left, but went for long walks and took trips on the water. On Wednesday I went to see the coral reefs in one of the glass-bottomed boats. It was a lovely sight, just like a miniature forest under water. A diver went down, and we could see him through the transparent bottom of the boat cutting specimens of the coral, which were given to the visitors. Another day I walked out to the lighthouse along a beautiful road. From the top of the lighthouse I could see all over the islands. I also went through the Governor's grounds and along the south shore, which is most picturesque. The air was cool, and the roads being well kept, walking was much pleasanter than driving. The day before I left I took the boat to the Aquarium. . . . The owner of the boat took us for a long sail round a score of the islands ; it was perfect fairyland. We sailed all round the islands on which the Boers were held in captivity, and he gave us an interesting account of the manner in which they were treated.

On the whole I had a very pleasant week, but wanted you all the time. The steamers to New York were so crowded that I found a difficulty in getting a berth, but finally managed to get a cabin to myself on the S.S. *Oceana*, which sails to-day.

On returning to New York he found that the hearing of the law case was definitely fixed to take place in the following month at Trenton, in New Jersey.

Early in May, on his fiftieth birthday, he wrote to his wife describing a visit to Atlantic City.

NEW YORK,
9th May, 1911.

. . . Just imagine—fifty to-day ! . . . It is lovely weather, and I should like to go into the country were it not that I am waiting at the office to hear about to-morrow's proceedings.

I went to Atlantic City on Saturday to meet Binney and Kenyon. We stayed at the Shelburne Hotel, and soon got through the finishing touches for the case.

Atlantic City is America's Brighton. Its chief feature (besides ridding people of their superfluous cash) is the Broadwalk, a promenade several miles long, elevated over the shore and built entirely of wood. Here the ladies walk to display their million-dollar frocks, and when tired of walking, which appears to be a chronic state, they are pushed along in a sort of Bath-chair. The procession of these chairs, miles in length, is quite a curious sight. The country round is sandy, flat, and uninteresting, and I fail to see what there is besides fresh air to attract such crowds of people. Two days gave me all that I wanted of the place. I got back to New York yesterday, and was accompanied by Kenyon, whom I found a most interesting companion. We are all to meet to-morrow at 8.30 A.M. to go to Trenton, so I am not returning to Montclair yet, but staying on a few nights here. I found quite a number of familiar faces at the hotel in New York. . . .

I will go and see Dr. Synnott soon and tell him how well you managed the voyage home from Bermuda.

I hear that the St. George's Club had their Annual Dinner recently in New York, and that our Ambassador, Mr. Bryce, made the finest speech of the evening. . . .

On May 12th he wrote to his wife from New York describing the law proceedings at Trenton.

As I mentioned in my last letter, the case was set for hearing on Wednesday, the 10th, but, owing to an urgent matter, the Court agreed to postpone the case until the next day. Mr. Kenyon and I met at the Pennsylvania Station and went together to Trenton. . . . The proceedings were interesting and exciting, and it was a strenuous day for both sides. The case terminated about five o'clock. There is not much likelihood of a decision for some months. The lawsuit is now at an end as far as I am concerned, with the exception of one or two conferences next week. I am therefore trying to arrange to return home. . . .

Fortunately, the hearing of the case being now concluded (although the decision of the judge could not be known for some months), the metallurgist was free to commence preparations for departure. He wrote to his wife from Montclair on May 19th, 1911 :

I expect to be home nearly as soon as this reaches you. I am finishing things off at the office and calling on numerous friends to say adieu. I think everyone at the Montclair Hotel has asked after you. . . .

Immediately on being released from technical work in connection with legal matters he booked his passage on the R.M.S. *Mauretania*, of the Cunard Line, and leaving New York on Wednesday, May 24th, landed at Fishguard on the evening of the 29th, arriving home on the morning of the 30th. The kindness and courtesy shown to him in New York and New Jersey had made his leave-taking more than a mere matter of form. He received good wishes for his voyage with the expression of their hope that he might speedily revisit the States from many of the American acquaintances whom he had now added to his long list of friends.

CHAPTER XX

RETURN TO ENGLAND

HE was now looking forward with keen interest to being in England and to prosecuting fresh research work. Although his stay in the States had been rendered pleasant by the friendships formed with men of science, and particularly by the close intercourse with Dr. Chandler, one of the most eminent American professors, yet he frequently stated he would not have undertaken the technical work for the law case could he have foreseen it would be so protracted, and that it would have involved such lengthened absences from England.

Neither legal nor business matters really interested him in any great degree, metallurgy, chemistry, and physical science claiming his real attention. On that particular path of metallurgical work where the scientific side is wholly subordinated to business methods for the rapid production of wealth he was an unfamiliar and unwilling traveller, this sphere, so commonly met with in the States, representing something not directly in his line of interest.

Delighted to be once more at Torquay, the first few days of June passed rapidly away. Regretting that his professional work left so little time for country life, these quiet interludes were always much valued. In America the home is frequently a mere hotel, from which the busy worker goes and to which he returns but as to a dormitory; thus the resumption of the home-life that British people appreciate so highly was

ever welcome to him. Other changes occurred, but there was no change in the affection with which he regarded his home.

"I have finished my work in the States, and am glad to settle in England again, General," he said a few days after his arrival on meeting his friend General D'Aguilar Jackson.

"Are you not going back again to America, then?" asked the latter.

"No," was the reply. "I have completed the work on which I had to go over so frequently, and shall not cross the Atlantic again. I have looked my last on New York."

This conversation, which the present writer heard, was recalled to her recollection some time later in a letter from the above-named Anglo-Indian officer.

Almost immediately after returning, the traveller was able to accompany his wife to a gathering for the presentation of a testimonial to their friend Prebendary Airy, on the completion of his twenty-five years vicariate of St. John's Church, Torquay. Whitsuntide was spent quietly at home, and he found on going to London on June 10th that all was business and festivity in the metropolis owing to the excitement of the Coronation season.

A reception held at the Royal Automobile Club, at which the Colonial Premiers were received by the Duke and Duchess of Teck, was an early engagement. Forbes Julian was much pleased with the new premises in Pall Mall. His wife had arranged to join him in town a few days later, and in one of his letters to her he describes the building and mentions the preparations for the Coronation, also alluding to the Metallurgical Club, of which he was now a member, and where he afterwards was accustomed to meet many leading spirits in the mining world.

ROYAL AUTOMOBILE CLUB,
17*th June*, 1911.

I went to see the new Metallurgical Club, but it is not ready yet. It looks as if it might be a nice place at which to meet mining men. The stands for viewing the Coronation procession are nearly finished, with the exception of the drapery. The poles for the decorations are also up. I have just arrived at this club, and intend coming here for the reception to be held to meet the Premiers to-morrow night. I have been looking round the building. The room in which I am writing to you is most luxurious. . . . There is a big wooden structure on the front of the building which contains our seats, and we ought to see splendidly. The streets to-day are excessively crowded, and it is hard to make headway at a moderate speed.

Shortly afterwards his wife joined him in London, and they had an excellent view of the Coronation procession, spending almost all the day at the Royal Automobile Club, which afforded him an opportunity of showing her over the new premises.

Some of their friends who were amongst the privileged spectators in the Abbey afterwards described to them the deeply impressive service during the Coronation of the King and Queen. Royal visitors and representatives of foreign Courts, distinguished statesmen, eminent ecclesiastics, great captains on land and sea, men of counsel, men of action—all were present at this remarkable assemblage, recalling to so many minds the Coronation of King Edward nine years before. For two days, during the Coronation Procession and the Royal Progress through London, the City was the centre of a splendid pageant, the windows being decked with flowers and the streets decorated with flags. They were filled with spectators, enthusiastic crowds of loyal subjects and foreign visitors thronging every coign of vantage, and waiting patiently for hours to greet the King and Queen in all the freshness and glory of the midsummer days.

The present writer's thoughts went back to the visit from His Majesty several years before with which her father had been honoured. She recalled the great interest then taken by the Prince and his brother, the late Duke of Clarence, in the geological collections and the pleasure they expressed at realizing the evidences of prehistoric life as pointed out by Mr. Pengelly.

The Coronation festivities have been more adequately described by other writers, and are within the recollection of all. Not only did London manifest an immense overflow of welcome, but the entire country was filled with rejoicing, great centres of population as well as tiny villages and hamlets joining in loyalty to the new Sovereign.

As well as participating in these scenes of universal enthusiasm and patriotic interest, various meetings were attended, invitations being also received for many scientific gatherings, including the soirée of the Royal Geographical Society and the conversazione of the Civil Engineers. The metallurgist was also present at the Royal Automobile Club when Prince Henry of Prussia was the guest of honour, the royal visitor receiving a hearty welcome in connection with the motor races. Before going to the Club the day had been spent at Brooklands, where their friend Mrs. Thackeray kindly motored Forbes Julian and his wife over to enable them to see something of the great automobile race. The flying machines were inspected and conversations held with more than one of the aviators and airmen. The whole season was filled with pleasant engagements. One of the evening gatherings, at which many scientific friends were assembled, was a party arranged to celebrate the silver wedding of Professor and Mrs. Meldola.

Leaving the hospitalities of the capital at the end of July, they returned to the West of England in order

to attend the Devonshire Association meeting which was to be held at Dartmouth. This historic town, with its fine port and unrivalled situation at the entrance to one of the most beautiful of our English rivers, is famous for its associations with the British Navy. Here were trained many of our greatest seamen. Our sailor King also received at Dartmouth his earliest insight into the work of that profession for which His Majesty has always shown such enthusiasm.

At the Royal Naval College the members were welcomed by Captain Evan-Thomas, and conducted over the grounds and buildings by the officers. Prince Albert, the second son of the King, was at that time at the College, and the Prince of Wales had only recently completed his course of instruction there. The Prince has since become a member of the Association, having always evinced much interest in Devonian matters. Mr. Burnard was president of the Association this year, and in his opening Address made many allusions to Kent's Hole, the famous cavern explored by Mr. Pengelly. During the meeting an important evening lecture was delivered by Mr. Hansford Worth, entitled "The Stanneries, the Story of the Western Tin Miner."

Returning afterwards to Torquay, Forbes Julian attended a meeting of the Natural History Society, at which his wife had been asked to give a paper, and spent part of August at home. Frequent visits to London on professional matters connected with the firm were also made, but his own literary labours suffered considerable interruption. He wrote from town on August 15th :

> I called at the publishers (Charles Griffin and Co.) on my way to the City and had a conversation about bringing out the third edition of "Cyaniding Gold and Silver Ores," as they sold out the whole of the second edition some time ago, and, in order to meet the demand, reissued the same edition.

At this period he was applying himself so strenuously to the affairs of the Butters Company that his own work, with the numerous improvements and additions for the volume suggested by his recent researches and fresh observations, had unfortunately to be delayed.

Leaving at the end of the month for Portsmouth, where the British Association in its cycle of change was meeting in 1911, a small but successful gathering was held at the great naval station. The presidency of Sir William Ramsay ensured an able Inaugural Address, and at the Chemical Section Professor J. Walker was chairman, whilst Professor Biles presided over that of Engineering. In the following spring Professor Biles was one of the assessors who assisted Lord Mersey in the *Titanic* inquiry.

Forbes Julian had now been a member for several years, and took much interest not only in the Papers but also in the work of the Association, being regular in attendance at the meetings of the General Committee and the committee of Section B. This was the last of the gatherings at which he was destined to be present, and no cloud overshadowed its brightness. The Association had always a welcome for him and his communications, and the cordial greetings of scientific friends after so many months' absence abroad afforded him much pleasure. In letters to the present writer, Professor Senier, President of Section B in 1912, and Dr. E. F. Armstrong, the secretary, allude to the value of his contributions to the Chemical Section.

On August 31st a visit made by Forbes Julian with other members to the Dockyard proved unusually attractive, as the Naval Commander-in-Chief, Sir A. W. Moore, showed great kindness to the metallurgist and his wife, pointing out various matters of interest and afterwards taking them on the water in

his boat. It was also owing to his arrangement that on Monday, September 4th, the members assembled on board the *Revenge*, which proceeded to Spithead and was attacked by torpedo-boats and submarines. These experiences added to the gathering a note of naval and seaside matters and marked it as of special character, in contrast with the numerous meetings held in the manufacturing towns of the Midlands and the North of England, where factories and workshops are the chief attractions.

Most of the West Country visitors were familiar with Plymouth and the dockyard at Devonport, but to others these scenes, especially the naval display, gave some insight into the mass of detail and training required by naval commanders.

An evening lecture on the " Physiology of Submarine Work " was delivered by Dr. Leonard Hill. This was particularly noteworthy to the metallurgist from his having had the experience of going down in a caisson used for the purpose of horizontal tunnelling under rivers, an operation Dr. Hill described in a detailed and interesting manner.

A link with the naval history of the past was afforded by a visit to that famous ship the *Victory*, with the memories of Keppel, Parker, Kempenfelt, and, greatest of all, of Nelson. The spirit of gallant chivalry (as justly felt in the Navy of France as in that of Great Britain) preserves in undying memory the brave action of October 21st, 1805, fought with so much valour on both sides. It is now nearly a hundred and fifty years since the *Victory* was first launched and well over a century since she led the way into the great battle.

During the progress of the British Association an interesting day was spent on September 2nd, Arundel being visited, where the historic castle and beautiful

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Photo by Russell & Sons, Southsea

GENERAL COMMITTEE BRITISH ASSOCIATION, PORTSMOUTH, 1911

(*Seated*), front row, from left to right: Prof. Herdman (Secretary); Sir E. Brabrook; Prof. Bonney (Ex-President); Sir W. Ramsay (President); Mayor of Portsmouth; Sir W. White; Major MacMahon (Secretary)
(*Standing in centre*), second row: Between the Mayor and Sir W. White—Henry Forbes Julian; to his right—the Rev. J. O. Bevan

grounds were seen, the party being afterwards entertained at luncheon by invitation of the Duke of Norfolk. In the afternoon they proceeded to Chichester, where the cathedral, the Cross, the old almshouses, and city walls were inspected, and tea taken at the Deanery with Dean Hannah. The distinctive features of the cathedral, such as the campanile, or detached tower, and the five aisles, were specially noticed; the library, with Cranmer's copy of Archbishop Hermann's service books and the interesting MSS., being also examined. Such visits were always much appreciated by Forbes Julian, who had made expeditions to several of the famous cathedral churches of England, whilst his wife had visited them all.

On the Sunday morning the Bishop of Winchester preached at Portsea Church at the special service for the members of the Association, his address being marked by the eloquence of diction and deep spiritual fervour which are characteristic of Dr. Talbot. Evensong was attended at Southsea, where Bishop Welldon preached to a crowded congregation. He was president of the Education Section this year, and both his address and sermon were remarkable from their philosophic acumen and penetration.

At the close of the meeting the metallurgist had to be back at his post in London, his wife returning to Torquay. After his arrival in town he describes, in a series of letters written to her in the autumn during intervals between home visits, his various engagements, and the project of a laboratory at which he was to undertake research work for the firm. A few extracts from his correspondence are inserted, inasmuch as (though they contain no striking incidents) they throw some light on the amount of work he undertook successfully at this time and the pleasure he found in

the companionship of old friends, many being enrolled amongst the members of the Institution of Mining and Metallurgy, the Metallurgical Club, and the Royal Automobile Club. Various references occur in these letters to the project on foot for him to undertake work for the firm in Chili, but he himself never entertained the idea of going to South America at this period.

Writing in September, he says :

> We are next going to send a man out to Chili. I was asked if I wanted to go, and if I could manage to do so; but I am much too closely engaged, and they will have to find some one else.

Towards the close of the month a few days were spent with his wife on a visit to her relative Miss Binyon, at Henwick Grove, near Worcester, and service was attended at the beautiful cathedral on Sunday. After returning to Torquay for one day, he had to be back in London on account of the large amount of work that lay before him.

During September the shadow of a great sorrow fell on literary circles through the death at Torquay of Archbishop Alexander. A pang of grief passed through the Church at the removal of so conspicuous a leader as the Irish Primate, and Forbes Julian heard of this loss with great regret.

On October 1st he describes a visit to the Mining Laboratory at South Kensington, which from its excellence aroused his enthusiasm.

> I went to South Kensington to meet some of the Committee of the new School of Mines. It is a magnificent place and will, I believe, be the best of its kind in the world. The mining laboratory is being fitted up from a fund left by the late Sir Henry Bessemer. Fortunately, I shall have access to it whenever I wish. I am fully engaged just now with a great deal of work that Mr. Butters is leaving me to look after, but

I managed to finish my paper, and it goes to the publisher in the morning.

On October 14th the above-mentioned paper on "Losses in Cyanidation" appeared in the *Mining Magazine*, and there were some complimentary remarks about it in the leader. The paper opens with the following sentences :

> The interest manifested in the filtration of slime, especially with reference to the prevention of mysterious losses of gold and silver during cyanidation, has of late been much intensified by sundry unfortunate events. The fact that such losses do occur is beyond doubt, but the cause, as well as the remedy, is far from apparent. It may easily be proved that the presence of slime accounts for much of the loss, which in a measure is preventable by the aid of filters. The following few notes touching on the more important uses and features of the vacuum type of filter may be of service in opening a discussion with a view to elucidating matters.

The author then proceeds to note and deal with the following points : Preparation of Pulp for the Filter; Cake Formation and Thickness ; Characteristics of Filter Cakes ; Care of the Cake ; Washing the Cake ; Re-precipitation and the Solution; Preparation and Application of the Wash Solution ; Water Wash ; Washing by Filtration and Decantation.

By mining men this contribution was considered important, for it contained much information as to recent developments.

The following remarks about the paper appeared in the editorial columns of the *Mining Magazine :*

> We are fortunate in being able to give our readers a timely article on obscure losses in cyanidation by Mr. H. Forbes Julian, the joint author, with Mr. Edgar Smart, of the standard text-book on cyanide practice. The article itself has the double merit of being prepared by a specialist who also happens to be able to express himself clearly ; in other words, he has

subjected his writing to a process of filtration, in which, however, a vacuum is conspicuously lacking. To us the result appears to be an enriched and clarified solution, ready for prompt precipitation in the mind of the intelligent reader.

A visit to Loughborough on some work for the Company was made about this time, but he was able to spend October 30th, the anniversary of their wedding day, with his wife at Torquay. Owing to absences abroad, they had not kept it together at their home for seven years.

After his return to town he mentions frequent meetings with Mr. H. L. Sulman, President of the Institution of Mining and Metallurgy, and other eminent experts at the Metallurgical Club. He now lunched there daily when in the metropolis, and the conversations held with the President, whether on metallurgical subjects or on reminiscences of South Africa, or merely table-talk, were always a stimulus to him. The evening concerts at the Royal Automobile Club were also appreciated, as these occasions were brightened not only by music but by social intercourse with many well-known motorists.

In the next letter quoted he alludes to the Motor Show at Olympia :

ROYAL AUTOMOBILE CLUB,
9th Nov., 1911.

. . . I have been kept closely engaged at the office lately, as the City is now very full of mining men, who constantly call me up on the telephone. The Metallurgical Club is crowded at lunch-time, and I have met Mr. Sulman and a number of old friends there. . . . All the conversation at the Automobile Club is political, and about Balfour's resignation. . . .

I had a pleasant evening at the concert here last night. There were some excellent entertainers and the audience was very appreciative. . . . I got to the Motor Show to-day about four o'clock, and found it very interesting and the best I have seen. There were such crowds of people that it was hard to get a good view of the exhibits, but what I did see was splendid

work. I hope to be down at Torquay and to meet our friends on Saturday, the 11th.

The Bishop of Exeter, the Bishop of Crediton, and Sir Ernest Satow all came to speak at the Pengelly Hall on November 11th on the scheme for diocesan aid for the cause of Church Extension in Plymouth and Devonport. The task before the Church in these towns, with the large numbers of soldiers, sailors, and dockyard men, is of the most serious magnitude. From the inception of the scheme much interest had been felt at Torquay in the work. On this occasion the Bishop of Crediton and Sir Ernest Satow visited Forbes Julian and his wife. They had invited the Rev. E. P. Gregg and some of the Torquay clergy to meet the Bishop at "Redholme," with Admiral Sir William Acland, General Sir Peter Lumsden, General D'Aguilar Jackson, and others interested in the work amongst soldiers and sailors. Mr. W. E. Norris was also present, and some conversation took place with him and Sir Ernest Satow on recent events in Japan and China, the author having visited and written on Japan, where the diplomatist had lived for several years. The meeting was well attended, notwithstanding that the day unfortunately turned out wet and stormy.

After the bright warm summer, the autumn of 1911 became somewhat unsettled. However, Forbes Julian was delighted to spend it in England and to pay as many visits as possible to his home in the West. Though cosmopolitan by training, the spell that Devonshire cast upon him seemed such that he never tired of its climate and scenery. After being frequently in foreign lands and so permeated by their spirit, yet he was not so entirely in harmony with his surroundings abroad, even when in the most beautiful scenes, as when in the county of his adoption, and the claims of

the metropolis never obtained any firm hold upon him.

Writing in the middle of November from the Royal Automobile Club, he describes a fruitless search for a suitable laboratory for the firm :

I had a glorious drive by the sea to Torquay Station, and saw a fleet of submarines manœuvring in Torbay. I had a good journey, and reached the office in time for the Board meeting, and spoke to some of the directors. It has been terribly wet everywhere except in Devonshire. I heard from several men at the club that they were drenched on the golf links, so (after all) dear old Torquay is one of the best places in the country. I have come to the club for the smoking concert, which promises to be well patronized. I was out with Simpson this morning, near Willesden, looking at some buildings for a laboratory. I went to the Metallurgical Club for lunch, and met a very interesting man who has spent most of his life in North and South America managing large smelting-works. He built Mond's great works at Sudbury, and speaks of the elder Mond in most affectionate terms. In the afternoon I went with Simpson to see more buildings for a laboratory. We drove about in a taxicab for hours, but could not see anything suitable. . . .

During the autumn he had been engaged with investigations concerning a scheme for the treatment of nitrate ores, a subject in which he had long taken a keen interest.

Early in December he had the opportunity of meeting several mining men at a gathering of sociability and good fellowship, as described in a letter dated London, December 7th, 1911 :

Last night I went to the Metallurgical Club, and met Mr. Sulman and a great many other friends, and we had a pleasant dinner together and afterwards a smoking concert. Some of the members contributed to the programme. One of these (Mr. Williamson-Milne), a Scotsman, who sat next to me at dinner, told some excellent stories. The items

given by the professionals were also greatly appreciated, and we had two good singers. Everyone seemed to enjoy the evening, which passed rapidly, for the proceedings were all over by 10.40. . . . I was surprised to find from your letter that you and two others were the only speakers after Lady Acland's paper on the Insurance Bill at the Pengelly Hall. I should have thought there would have been a great number. They seemed to have plenty to say about it in the House of Commons last night. . . .

Writing a few days later, he mentions various friends, and alludes to the Durbar Ball at his Club, which proved very successful.

ROYAL AUTOMOBILE CLUB,
10*th Dec.*, 1911.

Last night, after writing to you, I stayed in the smoking-room and had an interesting talk with a captain in the Dutch army. At lunch, at the Metallurgical Club, I sat at the same table with a man who was working with me twenty years ago in South Africa, and I had a long conversation with him about old times in the Transvaal. . . . Crohn left to-night for Germany, and I saw him off. . . . The other day at the Metallurgical Club I met Mr. Lance, who has just come from Alaska. His young brother is in Nigeria, tin-mining. I did not hear how their parents—General and Mrs. Lance—were.

. . . . .

I am greatly looking forward to having Christmas at our home and spending all the time with you. From your letter it appears that we shall have plenty of engagements. . . . I am intending to come here to-morrow night for the Durbar Ball at the club; large numbers are expected. . . .

Coming down to Devonshire later in December, some work was brought to be done during the brief holiday snatched from office routine in town. The festival was spent, as usual when in Torquay, in visiting Mrs. Maxwell and attending the services at church with his wife, and this last Christmas at home was

especially bright and happy. Many old friends were met with, and he had the pleasure of becoming acquainted with Colonel Burn, the recently elected Member of Parliament for the Torquay Division, and the Hon. N. N. Stranahan, formerly Senator for New York State.

CHAPTER XXI

LAST MONTHS AT HOME

AT the commencement of the year 1912 Forbes Julian's association with the Butters Company as their consultant had lasted nearly six years. During this period, to quote from a well-known member of the firm,

> He had been instrumental in developing a process which has revolutionized the metallurgy of gold and silver ores, and even under the pressure of research work and active participation in the building-up of this process, he found time to devote his attention to far-reaching activities.

After his death Mr. Butters wrote :

> He was so helpful to me always. His fund of knowledge was so extensive and certain, and I have relied upon him so many years for advice and assistance, that I feel quite disheartened in going ahead with the important work which I intended to carry out.

Anxious to prosecute his own work also, he (as previously stated) had been connected with the company on terms which should enable him to continue his literary and metallurgical labours. It will have been gathered that the lawsuit absorbed an unexpected amount of time, but now that this was practically concluded he hoped to have leisure to devote to fresh investigations. The company were also intending to start a laboratory, where they could have the benefit of his services, as mentioned in many of his letters. Few men have the opportunity of

following the progress of a fresh branch of science from its early years to its maturity, fewer still of being able to assist in its development ; but from his pioneer work in cyanidation and his later labours Forbes Julian was considered by his colleagues to be entitled to this position.

The New Year dawned with the expectation of a happy period of scientific activity and professional usefulness—the prospect seeming most fair, without any foreboding as to the grief and distress a few short months would bring.

Returning to London during January, he wrote home on the 20th describing a lecture in Albemarle Street :

> Last night I went to Sir James Dewar's lecture at the Royal Institution on " Heat Problems " and enjoyed it very much. His experiments were wonderfully successful as usual, and disclosed some remarkable discoveries in connection with heat. There was a large attendance of distinguished scientific men. Sir J. J. Thomson evidently took a keen interest in the discourse, and will doubtless give some explanation of the new discoveries in connection with his special subject of electrons. The Duke of Northumberland was in his usual place, and many familiar faces were to be seen. The exhibits were interesting, and there was a portfolio of Faraday relics full of autographs and portraits which, I think, would have attracted you as much as the scientific apparatus.

As already stated, the Jubilee of the Devonshire Association, the society founded by his father-in-law, occurred this year, and the approaching celebration recalled Mr. Pengelly's great services to science, the intervening years having served to establish his name securely amongst English geologists ; but his fame was not British alone, for, in the words of his friend Lord Lister, " the importance of his acutely planned and perseveringly conducted cave explorations is recognized throughout the scientific world."

Early in the year the great surgeon himself also passed within the veil.

A brief outline of the geologist's career has been already given in this book. Forbes Julian wrote on January 27th from the Royal Automobile Club, at the close of his letter alluding to the correspondence relating to Mr. Pengelly, numerous letters from scientists and old friends having been received concerning the notices appearing in different papers respecting his life's work.

Last night I got down early to the Royal Institution and had an interesting time inspecting the exhibits, which were chiefly physical apparatus. The lecture by Professor Bertram Hopkinson on "The Pressure of a Blow" was a difficult one to make interesting to a mixed audience, but I think the lecturer succeeded in rendering matters clear to everyone. His experiments were exceedingly good, and displayed a great amount of ingenuity in order to illustrate the effects graphically. Sir William Crookes, Professor Silvanus Thompson, Dr. Perry and his niece, and a host of others whom you know, were present. . . . How pleasant for you to have had such interesting letters about your father from Lord Coleridge, Sir Roper Lethbridge, Sir Alfred Croft, Lady Flower, Sir Edward Brabrook, the Bishop of Llandaff, and the Rev. J. O. Bevan.

In the next letter allusion is made to a request from Professor McKenny Hughes that Mr. Pengelly's favourite hammer might be presented to the Sedgwick Museum at the University of Cambridge, in order (as the professor wrote)

that it might be placed with those of Hugh Miller, Professor Sedgwick, Sir Charles Lyell, and other geological hammers with which it had probably been out in the field, and thus be seen by future generations of students, to recall his cavern researches and other geological discoveries.

Writing from London on January 30th, Forbes Julian says :

It would be very interesting to have your father's hammer amongst those of so many distinguished geologists at Cambridge, as Professor Hughes suggests. It is pleasant to read the appreciative letters from him and from Dr. Smith Woodward, Dr. Tempest Anderson, Professor Schäfer, and Professor Meldola.

Mr. Maxwell Adams, honorary secretary of the Devonshire Association, wrote as follows :

I am glad that your father's memory and great services to science are not forgotten. It is of particular interest just now, when we are to celebrate in July the fiftieth anniversary of the Society which he founded and did so much to promote. All our success is due to the firm and wise basis on which he started the Association.

At the above-mentioned Jubilee meeting Forbes Julian was desirous of being present, and was looking forward to entertaining all the members of the Association at the Pengelly Hall. He wrote to his wife suggesting this, saying :

. . . We could then invite all the members of the two societies he founded, the Devonshire Association and the Torquay Natural History Society, to meet other friends. The gathering together would probably be what the members of both societies would like best. . . .

In the middle of February he attended the dinner of the founder-members at the Royal Automobile Club, meeting, for the last time, many of the pioneers at this pleasant gathering. His duties kept him much in London during the spring, carrying on miscellaneous work (as consultant to the Butters Company) hardly capable of methodical record in this memoir, yet helpful to the firm and to the progress of metallurgy. Escaping occasionally from these cares to the quiet and pure air of the country, he greatly appreciated the beautiful early season of the year in Devonshire, and on the Saturdays and Sundays often enjoyed the

genial hospitality of Sir William and Lady Acland, Lady Olpherts, Captain Brine, Dr. Harley Gough, and other neighbours. A musical party in February given by the Honourable Helen Cubitt, just before Lent, at which he met many friends, was the last evening gathering in Torquay that he and his wife attended together.

The ninety-seventh birthday of the Rev. Evan Edwards, the oldest Baptist minister in the world and a resident at the watering-place, occurred this month. He was much pleased with the present of a book from Forbes Julian and his wife, and said at parting: "Everyone is so kind to me, particularly those who are not altogether in sympathy with me in political or religious matters." The aged pastor's touching message to his friends and to the people generally was to beg them "to think more of God and less of self; more of Christ and less of earthly things."

Amongst the meetings attended in February at the Pengelly Hall was one at which the Bishop of Mashonaland pleaded the needs of his vast diocese. Some conversation was held with the Bishop afterwards concerning work at the mining-camps and other industrial centres, also at the farming districts and amongst the large coloured population, the loyalty of the various native peoples throughout South Africa during the war being specially referred to.

At the end of the month Forbes Julian heard that the law case for the firm at which he had worked so long and unremittingly had been decided in their favour. This news was immediately conveyed to his wife in the following letter:

LONDON,
28th Feb., 1912.

I have good news to tell you. This morning we had a cable from New York to say that we had won our case. Everyone

in the office and the directors are much elated, and the telephone kept ringing me up to express congratulations. Mr. Butters has not yet heard the news because he is on board ship in the Pacific, and we shall not be able to get into communication with him for another week. Cables were sent to all the other members of the staff in South Africa, India, Japan, Canada, Mexico, and Central America.

We have had a beautifully bright day, and the trees are budding into leaf here, as in Torquay. I hope the frost will not come, for it would put vegetation back a month.

On receipt of the news, letters of congratulation poured in. Writing to him from Canada, his Scotch friend, Mr. James Johnston, says :

I must congratulate you on the success of the Filter lawsuit. It feels good, does it not, after all those years of weary waiting ? I am sure that Mrs. Julian will feel that she has been in it, too, and will be glad it is all over, and well over at that.

On March 6th the metallurgist wrote home saying :

This morning, on arriving at the office, I found a long letter enclosing the decision of the case, which occupies twelve pages.

Early in March he returned home, and discussed with his wife the probability of at last completing the work for a third edition of his book on Cyaniding.

On his next visit home on Saturday, March 16th, he mentioned his satisfaction at having remained in town the previous day, not only on account of the evening lecture given by Mr. Soddy at the Royal Institution on " The Origin of Radium," which he had attended, but also by reason of an American cable received from the Charles Butters Company asking him to go out again to the United States in connection with the Vacuum filters and the conclusion of the lawsuit. He said :

I sent out word immediately that I could not go again, and have not only cabled, but written a long letter, declining the proposal.

In answer to this refusal, which he showed to the present writer, another urgent American cable begging him to go arrived at Torquay (forwarded from London) on the morning of Monday, March 18th, and he finally consented. He said, handing the cable to his wife: "I suppose I had better go, as they seem so anxious for me to do so that I hardly like to decline again; but I go very reluctantly."

He then mentioned that there were men on the staff already in the States who could do what was required there, adding: "It is a mistake for me to leave England just now. I wish they had not asked me a second time to go, but would have accepted my refusal."

Invariably buoyant and cheerful, on this occasion alone through all the years of close intimacy in their married life was his wife distressed to see him evidently discouraged. During his busy career he had known many disappointments, amongst these being the inability to profit by the concessions obtained with much danger in the Barotse district, the severe illness which forced the relinquishment of his pleasant engagement at Frankfort, the loss of a large amount of income in the Boer War through the commandeering by the Boer generals of wagon companies in which he was a shareholder, and the burning down of his beautiful house at Shaldon. But all these reverses had been borne not only in silence, but with unfailing spirit, his simple tastes making pecuniary losses a slight grievance only. This unexpected summons to leave England seemed, however, from the first to give him a presage of coming disaster. In a letter from Croydon later in April to the present

writer, his aunt, Miss D. Neligan, mentions (in reference to his last visit to her and her sister) that he spoke openly of his dislike to going, and that they had never seen him in this mood before.

Having reluctantly consented to undertake the journey, the preparations for his departure were at once commenced and his passage was booked by the Butters Company on the R.M.S. *Olympic*, of the White Star Line, which was due to sail on April 3rd.

Back again in London, he wrote home on March 20th, 21st, and 22nd, and in all these letters mentioned that he would have to leave on April 3rd. In addition to the work for the firm he was preparing for them a little book on "Slime Filtration and Cyaniding," and it was found that this literary labour would necessitate a few days' longer stay in England. In another letter to his wife from London, on March 25th, he wrote :

> This morning we had the printers in, and, as they cannot have the proofs ready before April 3rd, Mr. Humphreys had my cabin on the *Olympic* cancelled and has engaged one on the *Titanic*, which does not sail until the 10th. . . . I shall have to make some fresh arrangements (at Hampstead), for I believe they have let my rooms.

If it had not been for the above-mentioned alteration of date in connection with the preparation of this publication for the firm he would have been a passenger on the *Olympic*. Several steamers were tied up at Liverpool and Southampton on account of the Coal Strike, but both these giant ships of the White Star Line were announced to sail early in April. It was not from any wish on his part to be on the great liner on her maiden voyage, but simply on account of concluding this literary work and the shortage of

steamers, that the *Titanic* was selected for him by the Butters Company.

The little book appeared not long after his tragic death at sea, and, in forwarding a copy of this unpretending treatise to the present writer, Mr. Humphreys, the secretary and manager of the Butters Company in London, wrote as follows :

CAPEL HOUSE,
19th July, 1912.

As you will naturally be interested to see in print the latest work of your dear husband, I am sending you under separate cover a copy of "Slime Filtration and Cyaniding." This treatise, though ostensibly a trade publication, contains so much valuable information on the latest of metallurgical developments that it cannot fail to secure a prominent place amongst the other valuable reference-books which the modern metallurgist finds necessary to keep constantly at hand.

At the end of March Forbes Julian wrote home describing a lecture given by Sir J. J. Thomson on "Results of the Application of Positive Rays to the Study of Chemical Problems," which he attended in Albemarle Street. Here he met for the last time the Rev. J. O. Bevan and others closely linked in friendship, scientific association, and intellectual tendency of thought.

ROYAL AUTOMOBILE CLUB,
30th March, 1912.

I went to the Royal Institution last night, getting there by 8.35, but failed to find Mr. Bevan. After the lecture was over, however, I heard my name called, and saw his genial face only a little way from where I had been sitting. The lecture was excellent, and the subject was one that interested me intensely. A great deal of it related to quite new investigations. Sir J. J. Thomson gave a good many humorous hits at chemists, which probably attracted the attention of Dr. Armstrong, who was present. The experiments were difficult for me to see owing to the distance at which I was sitting. The

exhibits were very interesting. On the whole, it was a most successful evening, and I only wanted you to make it quite perfect. I had a very busy day at the office, and if nothing fresh comes to hand I shall have practically finished on Monday, with the exception of correcting the proofs. . . . It would be delightful to have you with me, but, of course, if you do not feel quite up to the long land journey I shall try and content myself with the thought that you are keeping in better health at our home. I am afraid that there are not any through trains to San Francisco, but there need be only one change, that at Chicago. I hope to hear that you are rapidly getting well; do tell me what Dr. Cumming thinks. . . . I have arranged to stay on at Hampstead until next Wednesday, April 3rd, when I hope to join you at Torquay. I am getting through my work famously.

His wife (who had been ill with influenza during the spring) had been anxiously considering the possibility of joining him. It was felt that the voyage might be beneficial, but as he was expecting to proceed to California immediately, his usual thoughtfulness made him apprehensive that she might be unequal to the long land journey. Writing again from London on April 1st, he said:

I have been thinking it would be far too much of a risk for you to take by leaving so soon after this attack of influenza. It would make me terribly unhappy if you were taken ill on the way, and I should always reproach myself for wanting you to go. I know now it is by far the wisest thing to give up the idea, and I will try to hurry things so as to get back as soon as possible. I want so much to return to England to be with you for the Jubilee meeting of the Devonshire Association at Exeter in connection with your father's memory. . . . It will be delightful to be at home for the last few days. . . .

He returned to Torquay on April 3rd to spend Holy Week, and beautiful weather was experienced during these quiet days. On the peaceful, happy Sunday at home the sound of the Easter bells rang for the

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Photo by Captain Maxwell

A CORNER OF THE DRAWING-ROOM, REDHOLME, TORQUAY

last time in his ears—those bells which had hallowed his marriage rite, had so often called him to prayer, and were soon to summon mourners to the solemn service celebrating his last rest.

Spring had brought back leaf and blossom, and on Easter Day, going out with his wife for the first time since her illness, everything was bright with the rays of the Easter sun, all nature seeming to rejoice and hold high festival. Walking in the garden in the afternoon and watching the opening leaves fluttering in all their beauty in the breeze, he spoke to her of the great happiness that these quiet interludes in the country in her society had always brought into his active life. His last days on land were spent in the home that had been so dear to him; his last walks taken amidst the pleasant valleys and beauteous lanes of the county he knew and loved so well, clad with all the vernal freshness and beauty of the April verdure. And it was by his own unselfish renunciation that he was about to be separated—for so much longer than he was permitted then to know—from the companionship that had proved so perfect and had meant so much to both!

CHAPTER XXII

LETTERS FROM THE *TITANIC* AND THE *CARPATHIA*

THE R.M.S. *Titanic* was due to sail on her maiden voyage early on Wednesday, April 10th. It was found on inquiry that the journey from Torquay to Southampton would be unusually slow on account of the suspension of several trains owing to the Coal Strike. The steeplechases at Torquay on Easter Tuesday, April 9th, also added locally to the confusion and congestion of traffic. His wife therefore asked him whether he could postpone the journey one day and leave England on Thursday, the 11th, being transferred to the *Celtic*, of the White Star Line, which sailed from Liverpool on that date. He replied:

> I should like it much better, as the *Celtic* is a slower boat and I should have a longer time at sea, which I always enjoy, but I fear it might inconvenience the firm if I went later.

His wife suggested that, as he had been already obliged to alter his arrangements so as to await the proofs for their convenience, one additional day could scarcely matter, but, always averse to giving trouble to others, he felt he could make no further alteration.

His friends Mr. Myers and Dr. Cumming, and his wife's elder sister, Mrs. Maxwell, who called on Good Friday and Easter Eve, asked him if he preferred travelling on the new vessel.

"Not in the least," he replied. "I do not care at all for the palm-court and gymnasium and such extra attractions,

and never visited them when coming home last time on the *Mauretania*. I shall keep to the smoking-room and library, and only just look over the vessel before starting."

Whilst in London he had been unwell with a feverish chill, and it was not without concern that his wife thought of his embarking on a fresh expedition whilst still suffering from the effects of illness.

Leaving Torquay soon after midday on Tuesday, April 9th, the following extract from a letter to her written the same evening describes his journey.

SOUTH-WESTERN HOTEL, SOUTHAMPTON,
9th April, 1912.

The journey, with four changes, thirty-five minutes at Newton and forty-five at Exeter, made me think that it would have been too much for you in your present state of health. At Salisbury all the luggage for the boat was put into a special van, which was attached to the train. At Romsey this was disconnected and attached to the Southampton train, so that we had no trouble. I arrived here at 8.25. . . . I think it was wiser for you not to take the risk (of coming), as it is really very cold, with a strong wind. . . . At Exeter there were about twenty trunks for the *Titanic*, mostly second- and third-class passengers.

Writing to his sister-in-law, Mrs. Maxwell, from the R.M.S. *Titanic* at Southampton, he describes the steamer, and explains that he had been too closely occupied on Easter Monday correcting proofs to be enabled to visit her, for he had been working up to the very last with his accustomed vigour. He also regrets that his wife's recent attack of influenza had prevented her from accompanying him to the States.

ON BOARD R.M.S. *Titanic*,
10th April, 1912.

I was very sorry not to have been able to see you again before leaving Torquay. I was "rushed" up to the end. I left by the 1.35 train and got to Southampton at 8.25—

not bad for these times. This is the most wonderful ship I have ever seen; "palatial" is not the word for it. It is a marvel. Everything is spick and span even to the stewards and stewardesses. All the other great ships in the docks look mere cockle-shells. All it wants . . . is darling Hetty, but it would have been too risky for her so soon after the "flue."

His wife received from him three letters written on board the *Titanic*, one bearing the Southampton postmark and the other two that of Queenstown. The first gives some account of the vessel.

SOUTHAMPTON,
ON BOARD R.M.S. *Titanic*,
10*th April*, 1912.

I have just been over the ship and seen all the sitting- and saloon-rooms. It is all most luxurious. . . . The decks are magnificent, and the enclosed ones are fitted up more like smoking-rooms. My cabin is not the one shown . . . on the *Olympic* plan. . . . It is, however, more like a small bedroom than a ship's cabin. . . . If only you could have got safely to the ship, I know you would love to have the voyage. . . . So far there are very few people on board, but the London train has not yet arrived. . . . I left the hotel at 10 o'clock and walked to the ship, a matter of only ten minutes. My trunks were taken charge of by the South-Western man, who sent them to the ship and put them into my cabin. I want you to take great care of yourself. . . . Do everything that is possible to get rid of the influenza, and then I shall feel happier about leaving you. . . .

After the vessel had taken on passengers and mails at Cherbourg the same evening he wrote again, describing an incident which cast a gloom over the starting for the disastrous voyage.

ON BOARD R.M.S. *Titanic*,
10*th April*, 1912.

I was delighted to get your nice long letter and the telegram just after leaving the dock. Our ship had some trouble in getting away. There are a great many large steamers lying in the docks on account of the Coal Strike, among them being

the four American liners and the *Oceanic*. The *New York*, which was secured to the *Oceanic*, broke loose, due to the back-rush of water from the *Titanic* as she was moving past. Tugs rushed to the assistance and succeeded in holding the *New York*, which was moored to another part of the dock in order that we might move away without doing damage to other boats. This delayed us, and we did not reach Cherbourg until 7 instead of 6. There were great crowds watching us leave, but very few strangers were allowed on board.

I have now explored the ship, except the Turkish bath and the swimming-bath. The Parisian café is quite a novelty and looks very real. I do not know to what extent it is patronized, but it will, no doubt, become popular amongst rich Americans. . . . There are two bands, one in the lounge and the other in the café. I also visited the gymnasium, which is full of the most wonderful machines, which cure all the aches that flesh is heir to. There are over three hundred first-saloon passengers on board—a large proportion being Americans.

The weather has been fine, but cool and more or less cloudy. I expect we shall reach Queenstown about 7 in the morning, and I don't suppose they will give us time to write in answer to yours, so I am writing this evening. . . .

The following morning (Thursday) he wrote again before reaching Queenstown, and also sent a cable saying he had just met on the vessel his friend Colonel John Weir.

ON BOARD R.M.S. *Titanic*,
11th April, 1912.

We do not arrive at Queenstown until about noon, which gives me an opportunity of writing again. I had a good night and was very comfortable. The ship is so steady that it is almost the same as being on land. More than half the officers and stewards on board are familiar faces to me, as they are taken from the *Adriatic* and *Oceanic*. The two deck-stewards remembered me quite well, and allotted me a chair in a select part of the deck.

This is a brilliant morning and quite warm. . . . I think if you could only have reached the ship safely you would have been all right, for there are practically no draughts. Revolving

doors are much in use, which prevent any through currents of air. In the smoking-room there is a big fireplace, which makes it cosy. The other rooms also have fireplaces, but have imitation fires heated by electricity; they are poor things compared with the real article. . . . The bands are unusually good. . . . I will feel happy with the thought that you are taking care of yourself at "Redholme." . . .

This was the last letter his wife ever received from him.

Leaving Queenstown soon after two o'clock, the steamer had the coast in view until dusk. The final sight of land from the *Titanic* was of the green hillsides and rugged cliffs of Ireland, where his boyhood had been passed. The memories of his closing week on earth were of the home of his married life and the loved district of the West of England.

Descended from a long line of sailors and living by the sea and loving it, the present writer had always gladly accompanied her husband on his voyages; nor had she ever previously felt any anxiety about him when on the ocean. But on the night of Sunday, April 14th, after retiring to rest she was filled with some presentiment of coming evil and felt too anxious to be able to sleep. Rising up again before midnight, she continued for a long time reading prayers, especially those appointed to be used at sea. Eagerly inquiring the next morning from the servants if any news had come and scanning the papers, she was temporarily reassured, for the intelligence of the catastrophe did not reach her until the afternoon. But surely a guiding influence must have directed her thoughts, and some projection of the mind into space must have enabled her in some mysterious way to hold communion with one far distant in the icy regions of the North Atlantic, whose spirit before translation was expanding into a freer, fuller state.

It was afterwards a source of solace to believe that she had been permitted to be thus especially near to him in thought and prayer during those last solemn and supreme hours of existence.

Permission has kindly been given to include the letters of one of the ladies amongst the surviving British first-class saloon passengers, picked up by the *Carpathia* from the *Titanic* boats. These letters (being written by an eye-witness to a near relative immediately after the catastrophe) are specially worthy of note.

First letter :

ON BOARD THE *Carpathia*,
Wednesday, 17th April, 1912. 4.15.

. . . We have been on this vessel since Monday at 8.30 A.M., when we were picked up, and I have not been able to write a line before ; it has been too ghastly, and I still seem dazed.

Sunday night on the *Titanic* got *very, very* cold, icy, and I asked the steward why it was so cold. He said we must be in the region of ice. . . . N—— and I went to bed at ten . . . at a quarter to twelve we were awakened by an awful sort of bang and the engines stopping suddenly. We had an extraordinary feeling that something dreadful had happened, as when the engine stopped there was a terrible silence and then the awful noise of steam being let off. We heard one or two people walking up and down the passage, so we got up and asked the steward what had happened. He said we had struck an iceberg. This excited us, and we put on dressing-gowns and fur coats and went up on deck. We went forward and saw the bow of the ship covered in ice, but we could not see the berg. We walked about on deck and talked, and wondered if we should go back to bed or not, when suddenly the Purser appeared and said : "Will you all go quietly and put on warm clothing and your life-belts, and go up on the top deck ? The women and children will be put in the lifeboats first."

We all dispersed very calmly, got to our own state-room, but could find no life-belts. A nice man came with us and hunted for them, and then a steward came. He did not even know that the order for life-belts had been given, but he got

them for us from under the bed. We were told there was time to dress, which we did, and calmly and quietly went to the top boat-deck. You see by this the perfect confidence people had in the great steamer. . . . Then the boats began to be filled with women . . . to be lowered from the top-deck. We had a terrible scene with a little foreign lady who would cling to her husband, and at last he threw her into our arms and asked us to take care of her. We were only twenty-four women in our boat, with but one able-bodied seaman, two stewards . . . and one cook. . . . As I try to write all this it seems as if I could not go on ; it is all too terrible.

. . . When we reached the water we rowed a few yards, and saw that great ship with her bows right down in the water. Before we began to dress the water was pouring into the racket-court and baggage-rooms ; so the maid told us. The Captain gave us orders to row to a light we saw and come back to the boat to get others—we were only twenty-four women and four men, and we could have held sixty-five. It was the stillest night possible, not a ripple on the water and the stars wonderfully bright. The seaman, who was a splendid man, wanted to go back and get more people into our boat, but a discussion arose with the stewards, who said we had orders from Captain Smith to row for the light and we had no right to do anything else. . . .

We started to row to that awful light that never got nearer. I was at the tiller steering, and the women in our boat rowed with the one seaman for hours. . . . The terror of seeing the ship go down and the fearful screams and shrieks of the steerage passengers who were left was too awful. . . . Then the dreadful noise of all the air-tight compartments going—going . . . and then a noise like a distant battle or an earthquake, and then the whole ship went under. . . . We had to row away as far as we could because of the suction. We were in that boat till dawn, following the light that *never got nearer*. Then, suddenly, we saw the lights of this steamer, and we turned and began to row towards her. . . . We got there about 8.30, and it was beginning to get rough and very difficult to steer. I was numb from the waist downwards—when we got here we were pulled up in a hoist like a swing. N—— went up just before me. I could not walk when I got up as my legs had got numb. . . . N—— fainted directly she

got off the hoist ; the strain had been too much. Then all the women came into the saloon—some unconscious, some hysterical, and all more or less collapsed. They had brandy for us and hot coffee, and they were wonderful—all they did for us. There are about 150 young widows, and to see all these poor women is too terrible. They have managed accommodation for us all here, many sleeping on the floor in the dining-saloon ; we have a cabin with four of us in it, but are so thankful to be in anything. . . . The separating of husbands and wives was ghastly. N—— and I are so thankful we had no men relatives with us. . . .

Second letter :

ON BOARD THE *Carpathia*,
Thursday, 18*th April*, 1912.

. . . I think we all feel a little better this morning, we that are so fortunate in having lost no one, but all the poor women's faces are piteous to see. Yesterday morning I was very busy with a Miss B—— cutting out garments for the steerage and second-class children, some of whom had no clothes at all. We made little coats and leggings out of the blankets, &c.—then I went round the steerage and hospital with the doctor. . . . We are supposed to get into New York to-night, but are still in fog. Under ordinary circumstances they would not land us at night, but perhaps now they will. If you could only imagine how we *long* for land. This water all round is terrible. . . . The poor widows—oh ! it is dreadful to see them. N—— and I have helped in looking after these poor distressed souls, and it has helped us so much. . . . One girl has just come up and given me stockings and gloves to land in, as my stockings were all ripped up that night in the boat. People are so good. . . . One lady who has her husband saved (only about five of them have) is an American ; she is going to ask a friend to take us round in her car in New York to buy some things, as we have nothing but what we stand up in. . . . All the crew, captain, passengers, and stewards are perfectly sweet to us. There are two little French children who have lost their father, and I take one of them every day for a while. I love to do something, as it stops one thinking. . . .

Third letter, on reaching New York :

19*th April*, 1912. 1.15 P.M.

. . . At last we are here safe and sound; now that it is all over one feels full of gratitude and thankfulness for the deliverance from the dangers we have been brought through. . . . It all seems like an ugly dream. . . . We got into the dock last night at 9.30, after a dreadful time coming up the river, with all the newspaper tugs that wanted to put pressmen on board. Of course, our captain would allow no one on board but the pilot. All the people meeting the boats stood under their names, the officials standing in rows to keep back the crowds. . . . The reports that had been circulated about the condition of the passengers were terrible, and quite unstrung the men who were meeting people. . . . Thank God I am here!

The Countess of Rothes, after arriving in England, sent a letter to the present writer, from which the following extract is taken:

5 HYDE PARK GATE, S.W.

I have just returned . . . and am only so very sorry that I cannot give you any information about your husband. . . . I did not see anything of him at the time of the disaster. . . . I hope that you are feeling stronger now. I cannot tell you how much I sympathize with you in your great sorrow.

Mr. Shepherd, an American friend who was much attached to Forbes Julian, went to the Cunard Pier to meet the *Carpathia* in the hope of hearing some tidings, and sent the following letter to the present writer from New York:

NEW YORK,
23*rd April*, 1912.

I feel that I should let you know that ever since we received the report of the terrible fate of the S.S. *Titanic* I have put forth every effort to obtain some news from or about Mr. Julian.

The night on which the *Carpathia* arrived I went to the pier where the survivors were landed, but was unable to learn anything that would be a comfort to you. . . . Knowing Mr. Julian for a long time, I grew very fond of him, and I feel and share with you the loss sustained by his most untimely death.

CHAPTER XXIII

THE FOUNDERING OF THE *TITANIC*

"Quit you like men, be strong!"

AFTER leaving Queenstown the *Titanic's* run at 12 noon on Friday was 386 miles, on Saturday 519, and on Sunday at noon 546. The voyage during this half-week was pleasant and uneventful; the sea was calm and the weather fine.

The present writer gathered some account of these few days spent on the giant steamer from Lady Alice Leslie, whose nieces, the Countess of Rothes and Miss Gladys Cherry, were on board and afterwards rescued from the *Titanic's* boats by the *Carpathia*. Additional information was received from friends of Colonel John Weir and Mr. Hipkins. They both perished on the vessel together with Forbes Julian, but their relatives obtained accounts from passengers who had been saved. She had also two visits at her house, during the long illness that followed her bereavement, from another survivor, who recognized her husband from the portraits, and stated: "I used to see that gentleman walking up and down on the first-class deck very rapidly every day." A conversation held on Saturday, April 13th, with Forbes Julian was also repeated.

The general facts of the loss are known to the public through the official inquiry, and under all the circumstances the present writer has preferred to pass over many particulars and to avoid making observations

on the tragedy, though having naturally a strong opinion upon it.

On Sunday, April 14th, morning service was held on board in the saloon, and the account of the simple evening service arranged by the Rev. Edgar Carter will have been read by many people in the descriptions given by survivors.

The details of the dreadful disaster are not yet dulled in the public mind, so doubtless the accounts of the ice warnings received during the Sunday will be readily recalled.

At 11.40 on Sunday night the collision with the iceberg occurred, and the injuries received by the steamer were of such a nature that she sank in two hours and forty minutes. Had she been able to remain afloat a short time longer than she did, everyone on board might have been saved, as Captain Rostron, of the rescuing ship, the *Carpathia*, reached the scene of the wreck about 4 o'clock in the morning. "Coming hard" was his message by Marconigram directly he knew of the disaster. Captain Ransom, of the *Baltic*, and several other commanders also started promptly for the work of rescue.

The loss of the great liner, which sank so rapidly in the Atlantic abyss, carrying hundreds of men to their deaths, constituted the most appalling catastrophe in the maritime history of the world. It gave at once a rude shock to the theory that even the largest ships are unsinkable. In view of the first statement that no lives had been lost, and that the *Virginian* was standing by, a feeling of relief had prevailed. The joy and gladness created by this statement were soon dispelled. This and other conflicting messages received only added a vast accumulation of agony to the dreadful suspense and the alternations of hope and fear; and as hope died out, suspense gave way to despair.

It has been shown elsewhere in this memoir that Forbes Julian had extensive knowledge of the management of boats, and there were probably many of the passengers, both British and American, similarly experienced. It was suggested, therefore, by a few of his friends during these terrible days of uncertainty that possibly he and other male passengers might have been asked, in the scarcity of sailors, to form part of a crew for the boats.

The *Titanic* foundered at 2.20 A.M. on Monday, the 15th, carrying with her hundreds of male passengers, some women, and a large proportion of the crew. Probably in many of the chief towns of Great Britain and America some of these passengers were known. On this side of the Atlantic, Belfast and Southampton especially were filled with grief and consternation at the loss, the latter seaport being turned into a veritable city of mourning, as nearly all the crew had their homes there. Lamentation and distress were alike in these humble cottages and in the mansions of the wealthy; rich and poor mourning together, and seeing in imagination the same scene of horror, those they loved struggling by the starlight in the ice-cold water with none to save them. Very few men, even the strongest, could long survive in the winter water of the North Atlantic.

The survivor already referred to told the present writer that a group of men amongst the first-class passengers, who were well known by sight, had been helping the women and children as the boats were being lowered, and believed that her husband was amongst them, adding: "None of these brave men asked to be allowed to go in the boats." Testimony as to Forbes Julian being in this group was given to an American friend, Dr. Perkins, in New York, by another of the survivors of the *Titanic* shortly after the catastrophe.

"It was felt from the first," wrote one who knew Forbes Julian intimately, "that in such a situation as that in which the passengers on the *Titanic* were placed he would not be in the boats, but would be amongst those who showed such great courage in giving up their places for the safety of the women." Another old friend declared: "He was not the man to leave the ship as long as a woman or child remained on board." With hundreds of other men, he stood by to let the weak go first. Theirs be the praise that they perished, whilst the helpless were rescued. The number of men from the first and second class saved numbered together rather fewer than the men saved from the third class; so that it is satisfactory to feel that the steerage passengers were not unfairly treated.

The doom of those lost on the majestic steamer, the largest and most magnificent ship that had ever been constructed, called forth the sympathy of the whole civilized world. The contrast between the fancied security of the first few days on the great vessel and the dreadful disaster of the closing night aroused warm and deep feeling even in the most thoughtless. The heroism of those who so bravely faced death also evoked universal admiration. Just at the last, in one case mentioned by Mr. Lightoller (the second officer), when no women were in sight and a few men had climbed into a boat, they got out immediately on seeing some women come forward. The steamer was going down rapidly by the head, and the water rising higher and higher, whilst the boats were being sent away; yet those who remained behind showed the greatest fortitude, although aware that they had no possibility of leaving the sinking ship when the boats had been dispatched. Mr. Lightoller spoke truly in describing the conduct of the male passengers as "splendid." After the final boat had gone, when all

on board knew that the end must be near, the same heroism was displayed as had been exhibited from the first. This is mentioned by Mr. Lightoller and Colonel Gracie. The heroic bandsmen continued to play to instil courage. Even at the end, when numbers of poor steerage passengers crowded on the deck, Colonel Gracie wrote (in his pathetic and deeply interesting paper) in the *Outlook:* "There was no panic, though appalling death was evident in the near future. At this point I may be permitted to make the statement that, from my personal view-point at the bow of the ship as well as elsewhere, I saw nothing but unexampled self-sacrifice and self-control and the greatest courage under the most harrowing circumstances."

After the ship sank, when escape from death seemed well-nigh hopeless, both these courageous men swam to an upturned collapsible boat. They were taken off finally by a lifeboat, and reached the *Carpathia* safely. A few months later one of the present writer's relatives met Colonel Gracie's sister and heard further details. During the early morning of April 15th Captain Rostron rescued all those in the boats. "I thank God," said this brave sailor, "that I was within wireless hailing distance, and that I got there in time to pick up the survivors of the wreck." Before leaving the scene of the tragedy he held a thanksgiving service for the survivors, and a memorial service for those who had perished. The account of the latter service brought a slight measure of consolation to some of those newly bereaved, to whom the thought of the "vast and wandering grave" of those they mourned seemed more fearful than "the narrow house" which moves only with the earth's motion in the quiet cemetery or churchyard, where the spring flowers speak in each revolving year of the Resurrection.

Hundreds of miles were between those lost and their homes, and no tender heart could softly come to see their resting-place. "I think you can understand why I held the service. I felt that you all would," Captain Rostron said in a letter to the present writer, sent after returning to England.

In coming to the rescue so promptly in spite of the great danger from ice, and in the excellence of all the arrangements made, it was felt by everyone that the commander of the *Carpathia* had done the very best that could possibly have been done, and more than many men might have been able to accomplish under the circumstances. As to the terrible and tragic loss of life, the dead being counted by hundreds, all the far-reaching devices in use for procuring assistance had been in vain. The wireless telegraphy vibrated its appealing messages of distress over the dark waters and summoned distant vessels, but they were not near enough to save those not in the boats, and before the *Carpathia* could reach the *Titanic* she had ended her first and last voyage in spite of the despairing messages that had sent out the appeal in ever-widening circles through so many miles. The giant steamer, which had been thought of as a huge lifeboat, proved the coffin of many of the passengers and crew. Some went down with the vessel, others cast themselves into the water, still trusting that help might reach them on the great deep in time to avert the dreadful destruction that was impending.

Colonel Gracie, Mr. Bride, the Marconi operator, and others on the upturned collapsible boat, relate that they all constantly repeated the Lord's Prayer together during this awful time of danger. Never at service in crowded city or quiet country church could such an appealing cry have been sent up to the Great Creator and Preserver of Mankind,

all those of differing creeds and spheres of life uniting and seeming to recognize no help or presence but that of God in that supreme and solemn hour.

Concerning the number of persons rescued from the *Titanic*, Lord Mersey says (Report, p. 39) :

> Of the 712 saved, 189 were, in fact, men of the crew, 129 were male passengers, and 394 were women and children.

It is abundantly evident, as already shown from the testimony of Mr. Lightoller and Colonel Gracie, that on that fearful night, even when the last boats with the women were going off and the danger was evident to all, there was no unworthy panic, no trampling on the weak, and that amid much temptation to be selfish or cowardly, the brave, unselfish men left on board rose to the highest traditions of manhood. Their behaviour in choosing the path of honour with certain death before their eyes makes this loss a proud sorrow, but cannot compensate for such a sacrifice. Before sunrise almost all those left on the decks had sunk beneath the waves of the ocean, a few only having been picked up and rescued.

Until the *Carpathia* arrived in New York the list of passengers saved could not be definitely known. The remembrance of those days of suspense, of slowly dwindling hope and intense mental suffering, must ever remain burnt into the hearts and minds of the widows and relatives newly bereaved. The terrible certainty that hundreds of men had actually perished, which during the first few days had only been partially and imperfectly heard as a mysterious rumour, scarcely believed, caused distress and dismay to thousands of people for whom it was not a personal sorrow. Those more closely concerned had felt from the first that it must be true, as in the case of all overwhelming calamities. For them life itself seemed to stand still before the bitterness of this great bereavement.

A survivor whose letters were seen by the present writer described the parting of husbands and wives as most terrible. Those in the boats witnessed the most distressing horror of the night when they saw the great vessel sink down before their eyes. No element of terror which the mind can conceive could have been wanting in that fearful scene. A month later the history of these last tragic moments was related by a survivor to the present writer, who, seeing that she was very ill and so much affected as to break down completely, became also utterly overcome with emotion and unable to proceed with the narrative for some time.

The tragic character of the disaster was heightened by the thought of the many valuable lives sacrificed, amongst them (to mention only a few) being the Rev. Edgar Carter, Mr. Stead, Mr. Hipkins, Henry Forbes Julian, with his friend Colonel John Weir, Mr. Hayes, Major Butt, the artist Mr. T. D. Millet, Mr. Widener, Mr. Ryerson, Mr. Thayer, and Mr. Strauss—the Anglican clergyman, the noted journalist, the British scientist, the brave bandsmen, the stokers, and many of the courageous crew, faithful to the best British traditions, going down together, with the intrepid American military men and millionaires, all choosing the better part and heroically giving up their places in the boats to the women and children.

It is pathetic to think that a brave Englishwoman, Mrs. Carter, and an equally devoted American wife, Mrs. Strauss, perished with the husbands they would not leave; although a death so bravely met should call forth envy rather than pity.

Colonel John Weir was elderly and infirm, and his friend would not have left him to perish alone. Forbes Julian would have instinctively put away the thought of a selfish struggle for life, and it must have

been a comfort to the elder man to feel that a friend was at his side going with him into the darkness.

It is impossible to think that such lives were given in vain. Public men whose name and work were widely honoured, young men in the dawn of active life, and poor and unknown emigrants perished together, the widows and orphans who were left meeting in that fellowship of suffering which raises all souls above the conventionalities of existence. To most of these men life must have been dear, and the thought of sudden death bitter and dreadful. To many of them existence was not only abundant in the present, but full of the hope of further achievements in the future. Some were active workers who, by their personal efforts and public services, were entitled to special remembrance as scientists, men of letters, great captains of industry. It has been truly said that the young are sometimes impatient to die, the old are often content to die, but men in the prime of life mostly wish to live. As they leave youth behind a feeling of the value of life increases : there are projects to be fulfilled, books to be written, work to be finished. To all, life is a talent never to be regained.

In a single night, between sunset and sunrise, during a few short hours of oblivion to many unconscious slumberers, there had passed away from this earth hundreds of lives, some rich in promise with apparently happy futures, carrying with them all the hopes of other lives. But the Christian constancy and courage, the absolute self-renunciation and unflinching heroism with which so many met their doom, help us to realize that death is not the end of all things, and that this life is but the entrance into the true life, that it is but the portal of Eternity.

What was the measure of the dread disaster, what

of the momentary death pang, when " brought face to face with eternal being " ?

It may be recalled that during a quarter of a century of active work Forbes Julian had seen life in many lands, having visited the United States six times and Canada and South Africa each four times. He had been once to Mexico and once to the West Indies, besides making an extensive tour in Eastern Europe. With regard to the numerous long land journeys taken in South and Central Africa, and in frequently crossing the continent of North America, it is calculated that he had travelled by land and sea considerably over a hundred thousand miles—equal, roughly speaking, to four times the circumference of the globe. Thus he was equally familiar with ocean and lake, with snowy mountain and southern sky. Ever modest as to his own achievements, he seldom spoke about himself and scarcely ever about his journeys. The well-remembered tropical scenery of South Africa and California, the great lakes and forests of Canada, the unique architectural remains of ancient Mexico, the solemn stillness of the ocean, the peace of great wildernesses on the prairie and the veld—these things were not dwelt on to others. Less travelled friends in England were therefore never afraid of hearing long-winded narratives prefaced with " When I was in such and such a place." The foreign acquaintance made abroad, who frequently supposed that British people travelled so much because they had no inducement to stay at home, were not contradicted. Without sacrificing his own point of view, he was able to make due allowance not only for other people's opinions but for much that was prejudiced or distorted in their conception of British life and thought. A peacemaker in every quarrel, he never suspected his own influence

for good. There seemed about him ever an atmosphere of humanity and kindly feeling. He was invariably sympathetic and interested in others. "I do not think he had an enemy in the world. I never heard him say an unkind word of anyone, and he put the best construction on everything," remarked a barrister who had known him for years.

In his travels he threw himself heartily into the customs of the countries visited, thus making friends all along the route; and he had that special mark of a fine nature, that no outward circumstances made the slightest difference to his demeanour.

His life was blessed with strong affections, warm friendships, and congenial family surroundings, amongst "the friends given by Nature," as the French describe it. The cordial relations subsisting with his scientific colleagues, the sincere affection between him and his relatives, and the confidence and respect shown by his servants continued until the end.

In his dealings with his fellow-men he was invariably considerate to the poor as well as the rich. He had the social gift of being a good listener, following with attention the point of view of others, never laying down the law, engrossing the conversation, or correcting those whom he thought mistaken. Concerning his uprightness of character, one of the friends who knew him best wrote: "No one ever thought of questioning either his word or his motive."

Being in the full vigour of manhood when death closed his career, it was felt that much valuable scientific work might have been accomplished had his life been spared; but this was not to be. In the fullness of his powers and activity the call came, and with many men on the *Titanic* he gave up his life quite simply to save the weak. He might have escaped as did other male passengers, but, in the words

of the ship's second officer, he "died like a man." Happy they who were so gloriously faithful to duty in the solemnity of that awful hour. "I think it was the death he would have chosen," wrote a Canadian friend who knew him well. It was surely a fitting end to an unselfish life to close it by rendering assistance to helpless women and children; nor could they have found any champion more kindly and considerate. Passing much time in the free and irresponsible life of the mining districts of South Africa and North America amongst a mixed and motley cosmopolitan society, where gambling and speculation were common and old beliefs and restraints had frequently gone adrift, where many loose-living men were sinking in the mire and others walking in the dry places of a barren scepticism, whilst enthusiasms of all kinds had burnt low, he preserved his steady course, undisturbed and unaffected by the contagion of this environment. In the country his love of nature and quick susceptibility to all that was grand and beautiful in the world of sense kept him always happy; and the society of friends made on his travels brightened the absences from home. Goodwill towards his fellow-men filled his heart and was shown in his genial smile. He had the look of concentrated thought, but his expression was kindly rather than keen or penetrating. He devoted himself wholeheartedly to metallurgical science, but had a strong love for human nature. Although during the changing scenes of his fifty years he knew many hardships, yet his life was happy and useful until his varied career drew to its solemn close, and the nobility of his death called forth universal respect and esteem.

He shared deeply in the many interests of his time, and paid close attention to the broader aspects of political questions, but had little concern with party

struggles, all the engrossing work of his life being scientific, not political. Having the true pioneer spirit, every element in his natural character together with his early experiences combined to give this turn to his mind, which was innovating and original. He entered fully into the independent researches of science, and also into those issues of practical philanthropy which appeal so strongly to a thoughtful and sympathetic nature, taking a warm interest in the welfare of the people and in all wise schemes for their benefit.

As regards theological matters, he took the side of free and comprehensive instead of precise and exclusive views. A Broad Churchman, concerned rather with conduct than with creed, never particularly anxious to fit everything into a hard-and-fast system, he valued chiefly the essentials of religion—zeal for truth, sympathy with man, love of God.

A practical representation of Christianity had a charm for him greater than that felt for those more dogmatic systems in which so many minds find their chief comfort and support. He heartily appreciated the services of the Church, the beauty of sacred architecture, the power of solemn music.

He sought faithfully to follow the way of uprightness and unselfishness in life, therefore he showed the true spirit of self-sacrifice in death; hence the good work which he did and the good example that he left—these remain, and blossom and bear fruit.

A service held in his memory on April 29th at the church of St. Mary Magdalene, Torquay, was largely attended, the officiating clergy being the Rev. E. P. Gregg (rector of the parish), the Ven. A. H. Simms (Archdeacon of Totnes), Prebendary Airy, and the Rev. F. W. Gedye. The musical portion of the service was finely rendered by the full choir, the three hymns

chosen—" Now the labourer's task is o'er," " Rock of Ages," and " Nearer, my God, to Thee "—being sung with much feeling by the whole congregation. Although considerable doubt exists as to the last hymn having been played by the bandsmen of the *Titanic* after the catastrophe, it was certainly sung at the service held on board by the Rev. Edgar Carter not long before the collision. There were present at the memorial service many representatives of different shades of thought : two Presbyterian divines, several Roman Catholics, a Unitarian minister, and members of various Free Churches. Sympathizing friends included the late Senator for New York State, the president and members of committee of the Torquay Natural History Society, many well-known naval and military officers, and several scientific friends. No tribute to his memory, no act of sympathy to his widow, were withheld. For them all she has no adequate words of gratitude. " The crowded church," wrote Prebendary Statham, who was present, " testified to the general sympathy." Alluding to the heroism shown on the *Titanic*, the Prebendary wrote :

> The essence of all divinity lies in sacrifice and surrender. " God so loved the world that He gave His only-begotten Son " is the story of the Gospel, and what God does Himself He expects His children to do. The words of the Saviour about His own self-sacrifice—" Therefore doth My Father love Me, because I lay down My life "—may be extended to all the human family. And the spirit of self-sacrifice is there ; overlaid it may be by the pride of wealth, by the cynicism of great intellect, by the rudeness and roughness of the life of toil ; it lies there a fire ready to be kindled into life by the fiery torch of calamity. " In the image of God made He man," and as there is sorrow " in the presence of the angels of God " when that image seems overlaid or lost, so, when it shines forth before the world " bringing many sons to glory," we feel sure that it is a moment of Divine joy.

CHAPTER XXIV

SYMPATHY OF THEIR MAJESTIES THE KING AND QUEEN. APPRECIATION OF FRIENDS

SOON after the tragedy his widow was honoured by receiving a letter expressing the sympathy of His Majesty the King through Viscount Knollys, from which the following extract may be given :

His Majesty sincerely sympathizes with you in your irreparable loss, and feels deeply for you and for all those to whom the loss of the *Titanic* has been the cause of such great sorrow. The King remembers very well his visit to your house at Torquay, and how much also he was interested in the geological collections.

She was also honoured by receiving the following letter from Buckingham Palace, conveying through Mr. Wallington the sympathy of Her Majesty the Queen :

Her Majesty feels very much for you in the irreparable loss which you have sustained. It must, however, be some consolation to you and your relatives to feel that your husband was amongst those who displayed such great heroism in sacrificing their lives to secure the safety of the women and children.

A gracious letter from Marlborough House was also received, communicating the condolence of Her Majesty Queen Alexandra, through Sir H. Streatfeild, and expressing

Her Majesty's heartfelt sympathy in the terrible loss you have sustained and interest in your late husband's useful and varied life. . . .

Friends and colleagues of all shades of opinion joined in deploring his death, and amongst the many victims of the dreadful disaster few can have been more sincerely mourned, as a few sentences from some of the many hundreds of letters received, containing affectionate tributes to his memory from men of diverse views, may serve to illustrate.

The Bishop of Exeter wrote :

He had in a comparatively short life done much useful work, and his death leaves his country poorer in respect of its best riches—the mind and character of its sons. I very much wish I could be with you on Monday (for the Memorial service), but I am imperatively called to London that day for work which needs my presence, and which I can neither miss nor postpone without serious inconvenience to others. I shall, however, be with you in thought and prayer. It was strange and pathetic his being on board the *Titanic*. . . . May you be joined together in the eternal Easter and the risen life in Christ ; and meanwhile, may God give you that comfort which He alone has to bestow.

The Bishop of Crediton :

Your good husband was indeed a true man, of exceptional powers and ability, and yielded up his life in most heroic spirit. He was diligent in acquiring knowledge of a high class, and in his present condition of life will have more powers to learn things divine as they come from the Hands of the Great Creator. We can think of him as pursuing the study of those things which afforded him so much pleasure while in the flesh, with an understanding illuminated in the nearer Presence of God. Your comfort will be in sharing in his joy, as you are able to while still here, and in looking forward to experiencing those deeper joys together in a painless, deathless, sinless life.

Bishop Welldon :

So useful a life, so noble a death, will be to you an ever-inspiring memory, but I dare not try to realize how great your bereavement must be. Pray God comfort you.

The Bishop of Llandaff :

I was very grieved indeed to hear of your sad loss, and I am so sorry that I had not an opportunity of coming to see you, but I was called away from Torquay very suddenly on account of serious illness.

Bishop Boyd Carpenter (who paid the widow a visit of consolation and wished to take part in the Memorial Service, but was prevented by absence) wrote :

I am due to preach in London on Sunday and to speak at Derby on Monday. I wish it had been otherwise. We shall think of you, and you know that our hearts are with you.

Bishop Ryle (Dean of Westminster) :

Your dear husband ! The sympathy of us all goes out towards you. May God give you strength, courage, and faith, so that you may bravely endure this blow, and witness to the strength of belief among scientific people in the immortality of the soul and in our joyful reunion through Christ.

The Archdeacon of Totnes :

Nothing can rob you of the power and influence of the time that you have passed with a man so highly endowed as your husband was with excellent gifts ; and you have a solid foundation for the Eternal Hope by which even now heavy sorrow may be overcome.

The Rev. Prebendary Statham :

I am sure you will be sustained by the courage of your husband's end. "The Noble Army of Martyrs Praise Thee," and in that Noble Army it is good to have our dear ones enrolled.

A Sister of Charity :

If ever I should be in a like situation I would wish to be brave enough to give my life to save others rather than be saved myself. You have the great consolation of knowing that Mr. Julian acted thus bravely and unselfishly.

Countess de Alcoy (a member of an old Spanish Roman Catholic family) :

Believe me, dear friend, that the part I have in your sorrow is greater than you can imagine ; not one moment are you out of my thoughts, and only God can give you strength. So good a husband, so kind a friend ; the loss seems almost too much grief for a human heart to bear.

The Rev. Dr. Townsend, past President of the Free Church Council, an eminent Methodist Minister :

As to the dear one who has gone, I hope you will be able to think of him, not as being in the deep ocean, but as seeing the King in His beauty and being for ever safe from disaster and sorrow, and that God may fulfil to you the exceeding great and precious promises whereby we are made partakers of the Divine nature.

Another Nonconformist (a Congregationalist) :

A nation sorrows with you, and the knowledge must have upbearing power, yet of the agony of your sudden bereavement none of us can do more than faintly dream. But you will rejoice for him, called first to the fellowship of the Redeemer's sufferings and then, we believe, so immediately entering into His joy.

A member of the Society of Friends :

I think great sorrow and great loss seem to bring the other world nearer to us and help us to draw closer to the Comforter who is promised to us all. What a time of heroism it was ! One can but feel that God's Holy Spirit must have been near to help and sustain them.

The Rev. A. E. O'Connor, Unitarian Minister, sent a letter expressing

Grief and sincere sympathy in this great sorrow.

The Rev. N. Wallace, a Presbyterian divine, and his wife, wrote saying :

We were often remembering you during the last sad fortnight at our family altar . . . and we sympathize most

deeply in the loss of your dear husband under such tragic circumstances. Words of comfort fail us, but there is One who knows your sorrow, to whose pitifulness and tender sympathy we most prayerfully commend you—Jesus Christ, the same loving Saviour to-day as when He stood by the grave of Lazarus and gave the soul-inspiring message, "I am the Resurrection and the Life."

An intimate friend:

It may be some comfort to you to feel how greatly your dear husband was beloved and honoured, how everyone feels his passing hence was a noble ending to a brave, unselfish life—that he would never have thought for one moment of his own safety, but have been the very first to step aside, sacrificing his chance for others, setting a shining example even in that company of heroes who went with him through the mighty testing to the welcome of their great Captain.

Another old friend wrote:

Those who knew your husband are not likely to forget the kind and courteous gentleman, so learned and yet so unassuming, whom it was such a privilege to know. What fitter resting-place for one who delighted in Nature's wonders than the Great Deep.

Sir Arthur Quiller Couch, the well-known novelist:

I did not know that the foundering of the *Titanic* had so struck home to the daughter of my old friend. I am sorry indeed for you, although yours is a proud sorrow. It is clear—and the knowledge of it helps us all—that there were true men on board who, like your husband, died splendidly in the old pride of race. It is clear that the route always involves playing with risk . . . but even so the blow of the iceberg was a peculiarly terrible one. It is equally clear to me that on the doomed ship an enormous proportion of the passengers behaved nobly, and I certainly believe that your husband was among the noblest.

General Spragge:

I want to express my deep feeling of admiration for one

who closed a good life by a noble, self-sacrificing death, and of whom everyone who bears the British name must be proud.

General D'Aguilar Jackson :

I must write to express our heartfelt sympathy with you. Yesterday in church, while the whole congregation were standing during the playing of the Funeral March, I felt exactly as if I were standing at a brother officer's grave, and that officer your dear husband.

Colonel Burn, Member for the Torquay Division, wrote from the House of Commons :

Human sympathy is of little avail ; we earnestly pray that God may sustain and comfort you in your great trial.

Several letters were received from other Members of both Houses of Parliament.

The Right Honourable James Bryce, British Ambassador at Washington :

I had not heard of the great sorrow you have suffered by the loss of your husband on the *Titanic*, and Mrs. Bryce and I desire to offer you our sincere condolence. We have only just returned from a long journey, and so did not know of it.

I retain, I need not say, a very agreeable recollection both of the visit you and he paid to us here and also of the services rendered to science.

The Hon. N. N. Stranahan (formerly Senator for New York State) :

We feel much sympathy and are so grieved to hear of your great trouble in this dreadful disaster and tragedy, which has bereft you of your husband.

Mr. Eden Phillpotts, the Devonian author :

I remember the occasions in the past when it was my privilege to meet your brave husband. It is a pleasure to me to know that my books sometimes brought the West country a little nearer for him when he was far away from it.

Lady Alice Leslie :

I want to write, for it came so very near us, as we had our two nieces on board (Lady Rothes and Miss Gladys Cherry), who were both mercifully saved, and my heart bleeds for those who have lost relatives. Knowing how devoted you and Mr. Julian were, you must let me say how truly and deeply I feel for such an overwhelming sorrow as yours.

Admiral Sir William and the Honourable Lady Acland :

We have been thinking of you all through these terrible days. May God help and comfort you ! The men were brave and sacrificed their lives to save the weak, but it is terribly hard for those who are left behind.

The Honourable Helen Cubitt :

In the midst of the grief, you will feel your dear one is amongst the roll of his country's heroes, who will be mourned and honoured as long as England lasts.

Lady Olpherts :

I have gone through these deep waters, but if we are with our Saviour, leaning on Him, we get strength and support and the comfort our loving Father can and will give.

Mrs. Thackeray :

Can you think of the gain to him yet ? It seems as if that were the only comfort from the terrible loss to you and those who loved him. I feel sure his last act was to help others ; that was always his way. . . . He came to tea on my last visit to town, and when I was saying how much I thought of you his face lighted up with his wonderful smile ; I am so thankful for even that last glimpse of him. To know a good man is to be helped heavenward. God help you now and ever, dear.

Amongst scientific friends his loss was keenly felt. The late Sir Robert Ball, the distinguished astro-

nomer, who had been suffering from two months' serious illness, wrote from Cambridge Observatory :

Please accept the profound sympathy of myself and my wife. Surely there never was any catastrophe that merited and received such world-wide sympathy as this. His was truly a noble life sacrificed.

Professor and Mrs. Poulton, of Oxford :

We both feel very deeply for you in your terrible and tragic loss.

Dr. and Mrs. Smith Woodward (Natural History Museum, South Kensington) :

You will find a ray of consolation in the fact that he gave his life for others, and in that noble deed will always live in the memories of those privileged with his acquaintance.

Professor and Mrs. Meldola :

Your husband died, with many others, a hero's death. It must be a consolation to those bereaved that the names of their loved ones will live for ever in the memory of all who cherish brave deeds.

Professor Sir E. A. Schäfer, of Edinburgh, President of the British Association :

I tender you my sincerest sympathy in the grievous calamity that has befallen you. The one consolatory reflection is that your husband's death was a noble one.

Sir Archibald Geikie, the President of the Royal Society :

The newspaper gives me the first intimation of the staggering blow that has fallen upon you. I hasten to offer my heartfelt sympathy and to express my earnest hope that you will be enabled to bear up under the shock of such a tragedy. It is almost an intrusion upon the sacredness of your sorrow to venture to write to you at this time, but the sympathy of your friends may bring you some little comfort, and in that hope I send you these few lines.

Sir Henry Roscoe :

I sympathize with you deeply in the terrible loss you have sustained, and am interested to remember that your talented husband was an old pupil of mine, and that he was good enough to say that I had influenced his career.

Professor and Mrs. Myres, of Oxford :

We pray that the God of all comfort may be very near you in this time of spiritual need.

Sir Anderson Critchett :

If anything can bring a measure of comfort in such a deep trouble it is the knowledge that your dear one died the death of a hero, and has left a glorious example to generations yet to come ; but the loss of such a man must indeed be hard to bear.

Lady Flower :

I do not like the time to pass without trying to express the warm sympathy I feel with you, dear Hester, in the loss of your dear husband. You have the comfort of knowing he died nobly, whilst you can look forward to meeting him again in the great Future Life, as I experienced so deeply with my own dear husband.

Sir William and Lady Crookes :

Your sad bereavement has only just come to our notice. We assure you of our deep sympathy. It was a national calamity. It is some consolation to know how bravely our fellow-countrymen gave up their lives to save the women.

Mr. Edgar Rickard, Manager of the *Mining Magazine :*

I have known him for a number of years, but only recently has it been my good fortune to see him almost daily, and I feel the better for the inspiration and good he imbued in everyone who came in contact with him.

Mr. Humphreys :

I know that you will be brave, and proud of the fact that

in sacrificing his life for the women and children he died a hero. There are few who are regarded with such affection and esteem amongst their fellow-men as he was, and his loss is keenly and widely felt. The metallurgical engineers of the world have lost a brilliant, yet most modest, comrade.

Mr. G. S. Simpson :

To know him was to esteem and love him.

Mr. Pollard Digby :

Long before I ever met him his name was familiar to me. It was a pleasure and privilege to have as a courteous friend one whom I had before esteemed as the possessor of a brilliant reputation. Added to these recollections we have now the memory of him as a sharer in the heroism of those who died on the *Titanic* and shared in the glorious example of chivalrous duty.

Writing from Cambridge, Sir J. J. Thomson, the great physicist, said :

I offer you my most sincere sympathy in the loss you have sustained—a loss so great that words seem almost a mockery. It must, however, be a great consolation to you to know that of all the ways in which death can come, none is so noble as when it does so in helping to save the lives of others.

Lady Thomson also wrote :

We never knew until to-day that one of our friends was among the number of those noble lives whose unselfishness and calmness in death have evoked the undying admiration of the world. Their memory will never be forgotten. And terrible as the sacrifice of life has been, you will know, even in the midst of sorrow, that such a sacrifice goes far to ennoble the nation which can claim such heroes as its own.

Many appreciative communications were received from scientists in various parts of the world ; savants in France and Italy ; German engineers of Frankfort and Berlin ; metallurgists in Canada, Mexico, and the United States ; mining men from South

Africa ; and other friends widely separated in distant lands.

Mr. Anderberg, Stockholm :

Personally I mourn in Mr. Julian a very good friend for whom I had the greatest regard, both on account of his geniality and his kindness. There were certainly none of my English friends that I felt more honoured in knowing.

Herr Crohn, Berlin :

Who can console you in this time of sorrow ? . . . My dear friend, Mr. Julian, said that ever since the first day of his marriage he had been a perfectly happy man. And you will think of this when you bow to the Creator's will.

Mr. Leonard, the Canadian mining authority, wrote from Ontario :

I was much impressed by the remarkable knowledge possessed by Mr. Julian, more particularly in cyaniding, in which particular he was recognized as a world-wide authority. The whole mining world has suffered the loss of a man whose place it will be difficult to fill.

Dr. Synnott, of New Jersey :

I formed the highest opinion of Mr. Julian's character and abilities.

Mr. C. B. McCormick, of Chicago :

The brave *Titanic* men who went down are for ever a glory in their manhood and courage to England and America.

Mr. and Mrs. Carroll, of Boston :

We were indeed shocked to hear that Mr. Julian was a victim of the ill-fated *Titanic*. His loss to the scientific world will be very great indeed, and also to his friends far and wide.

A friend from Australia sent the following expression of appreciation :

Your great consolation must be that your beloved one met a hero's death, that he is one of the company of noble men

whose courage and self-sacrifice have made them immortal in British history—in the world's history, indeed.

A distinguished Englishman who had spent many years in Japan also sent words of truest sympathy and sorrow.

An Anglo-Indian friend :

Words seem utterly inadequate at such a time of heart-rending sorrow ; your dear husband gave up his life in the noblest spirit. " Greater love hath no man than this, that a man lay down his life for his friends."

Writing from the Transvaal, Mr. Edgar Smart said :

I venture, as one of your husband's oldest friends, to send a few words to let you know how much we sympathize with you in your sorrow. Mr. Julian's name as one of the missing passengers was cabled to Johannesburg some time ago, but I have been hoping against hope that there might be some mistake. There is this consolation, that Mr. Julian was one of the heroes who chose the better part to give safety to the women and children.

Mr. Rintoul, of Turffontein, South Africa, alluded to him as " one who was taken away from his many friends and admirers at such an early stage."

Mr. Livingstone Sulman wrote :

I have known your husband for many years, and from the first in the Transvaal regarded him with the highest admiration. Of late years we had seen much of him, and both my partner and myself fell under the spell of his quiet magnetism. . . . I cannot, therefore, express the shock that the terrible news of your husband's loss brought with it for us. The only comfort we can offer is our certain knowledge that Death, among the thousand heroes of the *Titanic*, found none more calmly strong nor more resolutely ready. I think of him as inspiring those about him with his own unconscious nobility and preparedness, and quietly repelling any fleeting panic in those around him. Death had no terrors for him, and he must have eased the passage across the dark water for many.

Sympathizing letters were also received from Captain Rostron, commander of the rescuing ship the *Carpathia*, and three of the survivors of the *Titanic*—the Countess of Rothes, Miss Gladys Cherry, and Mr. Lightoller, the second officer, who wrote : " Your husband died like a man."

Numerous touching tributes poured in from working people and others in humble walks of life. " We all knew that Mr. Julian would not go in the boats when there was not room to take everybody," said a cabman who had frequently driven him from Torquay Station. Similar testimony was borne by several of his old servants, and others who had worked for him at different times. " He died a brave hero in the sight of God and man," wrote one of them.

That his name was thus held in affectionate remembrance by so many of those who had served him, and that he had secured such a high place in their regard, is not the least that can be said in his praise. Their letters bear abundant testimony to his kindness and private virtues, forming a remarkable record of sympathy from the poor as well as the rich.

Commenting on this, his friend Sir William White wrote :

> You will know how sincerely we all sympathize with you in your great loss, and it is good to know that that sympathy is so widespread and embraces all classes, from their Majesties the King and Queen down to the humblest of those to whom you and your husband were known.

Some months after the tragedy occurred a Committee was formed with the object of providing a lasting tribute to his memory in the Church of St. Mary Magdalene, Torquay, where his marriage had been solemnized, and where also the largely attended memorial service had been held.

The Committee consisted of the following members :

Admiral Sir William Acland, C.V.O. ; the Hon. Lady Acland ; Maxwell Adams, Esq., Hon. Sec. Devon Association ; Sir Robert Ball, LL.D., F.R.S. ; Rev. J. O. Bevan, M.A., F.S.A., F.G.S. ; Captain Brine ; the Hon. Helen Cubitt ; Mrs. Hamilton Cumming ; Miss M. M. Candy ; Miss A. V. Dutton ; Rev. E. P. Gregg, M.A. ; Dr. F. H. Gervis ; Rev. W. W. Goldsworthy, M.A. ; Dr. Harley Gough ; Miss M. Gray ; Miss Alice Heath ; General D'Aguilar Jackson ; Major MacMahon, LL.D., F.R.S. ; Professor Myres (Oxford) ; H. L. Sulman, Esq., F.I.C., M.I.M.M. ; Hon. N. N. Stranahan (Ex-Senator U.S.A.) ; Sir J. J. Thomson, O.M., F.R.S. (Cambridge) ; W. Whitaker, Esq., F.R.S., F.G.S. ; A. W. Wilkinson, Esq.

Mr. Livingstone Sulman, a member of the Committee, wrote to the widow in the following terms :

Just as the most enduring claim to the enthusiastic regard of our later generations has been to have been one of " the noble Six Hundred," or to have stood in the red line on the deck of the *Birkenhead*, so it is wished to commemorate your dear husband's participation in the " Communion of heroism " of that glorious company on the *Titanic*, whose self-denial called forth the admiration of the whole world.

The opposite page shows the inscription for the Memorial which was contributed by another member of the Committee, the Rev. J. O. Bevan, with the assistance of Bishop Boyd Carpenter.

It was unveiled by the Ven. Archdeacon Simms on February 24th, 1914, in the presence of a large congregation.

Ad Majorem Dei Gloriam

THIS TABLET

IS ERECTED BY A WIDE CIRCLE OF FRIENDS
IN AFFECTIONATE REMEMBRANCE
OF

HENRY FORBES JULIAN

Member of the Institution of Mining and Metallurgy,
Born Ascension Day, 9th May, 1861 ;
Married in this Church 30th October, 1902 ;
Passed away 15th April, 1912.

During the whole of his working life he laboured at the solution of metallurgical problems in three Continents, and both by his writings and practical skill exercised an influence which will long endure.

He was amongst those who gave their lives for others in the disaster which befell the R.M.S. *Titanic*. This heroism and self-denial called forth admiration from the throne to the cottage.

"Greater love hath no man than this, that a man lay down his life for his friends."

From the Monthly Magazine of St. Mary Magdalene Church, Upton, Torquay, March, 1914.

In the presence of a large congregation the Memorial Tablet to the late Henry Forbes Julian was unveiled by the Ven. Archdeacon of Totnes on Tuesday, February 24th. The service was of a quiet, yet impressive character, and was conducted by the Rector, the Rev. E. P. Gregg. Speaking from the chancel steps, the Ven. Archdeacon Simms said that the ceremony recalled to mind one of the most striking calamities in the history of the sea. In one way there was about the catastrophe something which was peculiarly arresting and very poignant, which did not usually attend the passage from this world into the unseen life. Yet, when they began to look at things from the point of view that Christians ought to view them, he supposed that most were able to take the considered view which belonged to the Christian faith, and to realise the truth of the words of old, that whether the call came in the quietness of the home life or in the midst of the darkness of the night at sea, the souls of the righteous were in the hands of God. That view was one which they peculiarly needed to take in the circumstances of the "Titanic." There was a special meaning which they ought not to forget in the commemoration within the walls of a church of the names of those who in their lifetimes worshipped there. That special meaning was that when they looked upon the name commemorated they remembered that it was the name, not simply of their friend or of one who was distinguished in the world, that it was no barren commemoration of a life that had ended, but that it was a continual reminder that the name written on the wall of the church was also the name of one who lived in the larger Church of those ransomed souls for whom Christ died. It was a living person who was commemorated, not simply one who had gone. When they looked at the memorial they looked upon the name of one who lived in the heavenly temple not made with hands. The Ven. Archdeacon unveiled and dedicated the memorial, and the ceremony concluded with the singing of the hymn "The Saints of God."

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